VANCOUVER ISLAND TRANSPORTATION PROJECT
TRAFFIC ANALYSIS AND FORECASTS

5-01-190 September, 1983

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VANCOUVER ISLAND TRANSPORTATION PROJECT

TRAFFIC ANALYSIS AND FORECASTS

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A. INTRODUCTION

A. INTRODUCTION

1.0 BACKGROUND AND OBJECTIVES

Approximately two years ago, the Ministry of Transportation and Highways began a review of the long-term transportation requirements of Vancouver Island, with a view to developing a strategic transportation plan and transportation policies for the Island.

As part of this process, the Ministry published its own "Vancouver Island Transportation Project Discussion Paper" in May, 1981, together with "A Study of the Projected Growth of the Economy of Vancouver Island 1981-2001" prepared for the Ministry by Garth Edge International Inc.

The first of these documents, the discussion paper, was published and distributed by the Ministry with the intent of stimulating discussion about the development of a consistent and systematic planning approach to addressing current and future transportation issues on Vancouver Island. The paper briefly reviewed the present transportation services on Vancouver Island and discussed some of the issues, constraints and other problems foreseen in meeting future transportation requirements.

The Garth Edge report presented an overview of the Vancouver Island economy; examined the role of Vancouver Island in the wider context of the Province's economy; reflected upon industry developments and regional growth; and prepared population forecasts for the Island.

The next step in the planning process began in September 1982, with the initiation of the "Traffic Analysis and Forecasts" project - the subject of this report. Its objective was to assemble an inventory of the Island's present transport services and traffic flows, and provide baseline traffic projections to the year 2001, assuming that no major changes occur in factors affecting the system.

More specifically, the major objectives of this project were the following:

- To describe the transportation infrastructure of the Island including route systems, major fixed facilities, carriers and services;
- To compile and analyze data on traffic (both passengers and freight) and on factors which affect it;
- To prepare forecasts of freight and passenger traffic to the end of the century and highlight potential capacity constraints.

The results of this project were seen as essential input to, and providing the basis for, more detailed studies dealing with passenger transport on the Island, freight transport, and transport connections between the Mainland and Vancouver Island. Ultimately, the Project was intended to provide the Provincial Government with the basic tools necessary to enable them to address current and future transportation issues concerning Vancouver Island, and their coordination with other related development plans.

2.0 ORGANIZATION OF REPORT

The results of this project are reported by mode of transportation - automobile, ferry, commercial vehicle, rail, air and marine - in Chapters C, D, E, F, G, and H respectively.

Each of these chapters describes the transportation network, major fixed facilities, carriers and services of the mode concerned. It provides data on current traffic flows, projects this traffic to the year 2001 and provides a perspective on major issues and system capacities.

Chapter A outlines the context, the objectives of the project, and the general approach taken.

Chapter B presents some general perspectives on the economic outlook for Canada, British Columbia and Vancouver Island. The growth rates indicated in this chapter contribute to the growth assumptions made in each of the following chapters dealing with the individual transportation modes.

Chapter I provides a summary of the results and presents a series of recommendations for additional data collection and analysis which would be useful within the terms of reference of the overall planning process for transportation systems on Vancouver Island.

The various Appendices provide detailed tabular material in support of the figures and summary data presented in the body of the report.

3.0 GENERAL APPROACH

As has been indicated, the purpose of this project was to place into an organized perspective the many diverse components of the transportation system which serves Vancouver Island, and to review the ability of the system to meet projected requirements.

Such a task is clearly a complex one, requiring information from dozens of private firms and public agencies and considerable effort to combine it into a coherent whole. Thus, this project involved two major areas of effort:

- collecting key data describing all manner of traffic movements to, from and on Vancouver Island, together with demographic and economic factors which affect them.
- analyzing and interpreting this information for the major components of the Island's transportation system, producing forecasts for each and highlighting potential capacity limitations.

The Vancouver Island transportation system was considered as comprising 11 major components of traffic under six modal headings. Data have been compiled and projections prepared for each of these 11 components of traffic:

- Automobile:	• traffic by Island Residents • traffic by tourists (off-Island Residents)
- Ferry:	• passenger traffic • automobile traffic
- Commercial Vehicle:	• bus traffic • truck traffic

- Rail:
    - passenger traffic
    - freight traffic
- Air:
    - passenger traffic
    - freight traffic
- Marine:
    - domestic and international freight

Data were obtained from the following sources:

- Government of British Columbia: Ministry of Transportation and Highways, Ministry of Industry and Small Business Development, Ministry of Municipal Affairs;
- Regional Districts: Capital Regional District;
- Municipalities: Nanaimo, Port Alberni, Campbell River;
- Government of Canada: Statistics Canada, Transport Canada;
- Carriers: major truckers, railways, ferries, airlines, bus companies, barge services;
- Major industries, particularly forest mills;
- Previous studies and information from industry organizations and research agencies.

For the purposes of this project, Vancouver Island was subdivided into 29 geographic zones. These 29 zones were based on a combination of the Highway Zones used by the Ministry of Transportation and Highways and the Census Districts used by Statistics Canada. In Appendix B-1 the 29 geographic zones are listed, together with their 1976, 1981 and projected 2001 population estimates. The zones are also shown on all of the maps used throughout this report.

In terms of traffic flows in each mode of transport, 1980 was chosen as the "base-year" for making projections. This was done for two reasons:

- 1980 was a peak year for general economic activity, thus providing a view of the transportation system during an actual busy period. By contrast, the current recession began to be noticeable in the latter part of 1981.

- Complete data for 1980 were, in many cases, easier to obtain than for 1981.

For each of the 11 components of traffic, origin-destination tables were produced to the extent possible using existing data. From the point of view of understanding a transportation system (particularly the flow of traffic within it) and providing a firm yet flexible basis for future analysis, such a representation is generally the most useful.

Automobile traffic is the most complex mode since it involves all zones and is responsible for the largest number of individual traffic movements. The other modes involve far fewer zones and movements. For automobile traffic, it was possible to construct origin-destination tables by combining the results of ten separate road-side traffic surveys carried out in recent years. The traffic loadings derived from these tables for each of the links in the Vancouver Island road network are generally in good agreement with the traffic counts made by the Ministry of Transportation and Highways. Computerized procedures were developed to project future origin-destination tables, and to produce link loadings for any specified (existing or potential) road network. Future volumes of automobile traffic were related directly to the population growth projected for each of the 29

Vancouver Island zones. Island Resident and off-Island Resident traffic were projected separately and individual link loadings calculated.

For other modes, it was not possible to compile complete origin-destination tables from existing data sources. In most cases traffic estimates were available only for individual route segments or for major cargo handling points. Traffic projections in these modes were based on combinations of recent modal trends, population growth and assumptions about future economic activity.

For each traffic component, the projection procedure and assumptions used in making projections are described in the forecasting section of the chapter dealing with that component.

B. ECONOMIC PERSPECTIVES

B. ECONOMIC PERSPECTIVES

1.0 INTRODUCTION

Transportation activity, particularly freight, depends very much on general economic conditions. Thus, transportation forecasting and planning must be done with reference to major economic developments and forecasts. However, making long-range economic forecasts is an uncertain proposition even at national or provincial levels. It is doubly so in the case of small, regional areas such as the 29 Vancouver Island zones defined in this study.

The approach taken in making long-range projections for this study was therefore two-fold. In the first instance, the results from several long-range forecasting studies were combined to produce an overall picture of the economic climate in which Vancouver Island is expected to find itself over the next twenty years. Foremost among these were the "Garth Edge Report" quoted earlier, the "Transport Canada Freight and Passenger Forecasts 1982" published by the Transport Canada Economic Analysis Directorate in December, 1982, and discussions with officials in the B.C. Ministry of Industry and Small Business Development.

The assumptions and forecasts of the Garth Edge and Transport Canada publications are in reasonable agreement with the views obtained from government and industry sources during this study. However, the growth rates quoted in the Transport Canada report are considered to be somewhat too high for continuous application throughout a twenty-year forecast period.

The second component in making long-range projections for this project involved preparing population projections for each of the Island's 29 zones. These population projections are based on the B.C. Research publication "British Columbia Population Projections: 1984-2006" which has just recently been released. This publication incorporates the results of the 1981 Census and presents population projections for each school district in the province, including the 13 districts on Vancouver Island.

2.0 THE GENERAL ECONOMIC ENVIRONMENT

A serious world-wide recession and economic difficulties in the U.S.A. have severely weakened the Canadian and B.C. economies during 1982 and early 1983. The output of goods and services has declined, and unemployment is at record high levels. The general consensus among economists is that the short-term outlook (latter part of 1983 and into 1984) is for slow recovery.

However, over the long term (the next 20 years, to the year 2001), the potential of the Canadian economy is considered to be good. Thus, in making the projections in this report, relatively little weight has been given to the economic situation prevailing over the past year.

Because the economy of Canada (and British Columbia) is highly trade dependent, it is greatly affected by the economic health of its major trading partners. As may be seen from Table B-1, Transport Canada expects the short-term economic growth of these trading partners to exceed that of the recent past (i.e. 1974 to 1980), but remain below the growth rates experienced prior to this (i.e. during 1962 to 1973).

On the domestic front, Transport Canada expects moderate economic growth for Canada, comparable to that of the U.S.A. Population growth will be in the order of 1% annually and prices are expected to stabilize. However, world markets for Canadian raw materials are expected to remain weak. Table B-2 shows the average annual growth rates assumed by Transport Canada for a number of major Canadian economic indicators.

TABLE B-1

ANNUAL ECONOMIC GROWTH OF CANADA'S MAJOR TRADING PARTNERS

	Actual		Forecast		
	1962 1973	1974 1980	1981 1985	1986 1990	1981 1990
U.S.A.	4.2%	2.4%	2.3%	2.7%	2.5%
E.E.C.	5.4	2.1	2.8	3.1	3.0
Japan 5.0		11.2	3.0	4.8	5.2

Source: Transport Canada, Freight and Passenger Forecasts (December 1982)

TABLE B-2

ANNUAL GROWTH RATES OF CANADIAN ECONOMIC INDICATORS

	Historical	Forecast		
	1975 1980	1981 1985	1986 1990	1981 1990
GNP	2.6%	2.6%	3.3%	3.0%
Exports	3.8	2.7	3.9	3.3
Imports	2.6	3.7	2.5	3.1
Personal income	2.4	1.3	2.0	1.6
Population	1.1	1.1	1.0	1.0
Employment	2.6	2.1	2.3	2.2
Prices (CPI)	9.1	10.1	8.3	9.2
Unemployment	7.6	8.1	5.4	6.8

Source: Transport Canada, Freight and Passenger Forecasts (December 1982)

Many analysts predict a difficult adjustment period for countries with advanced economies, as the growth psychology underlying much of contemporary economics is being questioned from a value standpoint or found to be untenable in light of current economic and political realities. Long-term structural unemployment is likely to be a feature of life in Canada and B.C. for the foreseeable future,[a] even following an upturn and during positive growth in the economy.

Between 1976 and 1980, the average annual growth rate of the B.C. economy (GDP) was 4.5%,[b] compared to 3.5% for Canada as a whole. Transport Canada expects the average economic growth in British Columbia to outpace that in the rest of Canada over the next decade. Table B-3 shows the average annual growth rates anticipated for major sectors of the B.C. and Canadian economies.

The growth rates in Table B-3 are expected to result in moderate growth of freight activity of about 2.7% annually for both B.C. and Canada. Truck flows in B.C. are expected to grow somewhat faster, at a 3.2% annual rate. Table B-4 shows annual growth rates projected by Transport Canada for domestic passenger travel in British Columbia and Canada.

The growth rates given in this section, while probably somewhat on the high side, are considered to provide a reasonable set of upper bounds for forecasting purposes in this study.

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[a] Task Force Report: Labour Market Developments in the 1980's.

[b] As measured in constant dollars. British Columbia Economic Accounts, 1961-1960. Statistical Table 1.

TABLE B-3

ANNUAL GROWTH RATES OF ECONOMIC SECTORS
IN B.C. AND CANADA: 1981-1990

Sector	B.C.	Canada
Agriculture, Forestry, Fishing	2.7%	2.7%
Mining, Oil, Gas	2.3	1.9
Manufacturing	4.2	3.6
Construction	4.3	3.2
Utilities	3.2	3.4
Transportation, Communications	3.3	3.3
Other Services	2.8	2.3
Government, Defence	1.5	1.7
Total	3.0	2.8

Source: Transport Canada, Freight and Passenger Forecasts (December 1982)

TABLE B-4

ANNUAL GROWTH RATES OF DOMESTIC TRAVEL (PERSON-TRIPS)

	British Columbia			Canada		
Mode	1980 1986	1986 1991	1980 1991	1980 1986	1986 1991	1980 1991
Automobile	3.3%	2.5%	3.1%	2.1%	2.0%	2.1%
Air	3.7	3.6	3.7	3.3	3.6	3.4
Rail	4.4	3.7	4.1	4.7	4.3	4.5
Bus	3.7	2.8	3.3	2.4	2.2	2.3
Total	3.7	3.5	3.7	2.4	2.4	2.4

Source: Transport Canada, Freight and Passenger Forecasts (December 1982)

3.0 PERSPECTIVES ON BRITISH COLUMBIA

As has been indicated in the preceding section, the outlook for the Canadian and B.C. economies is not good, particularly in the short term. In the longer term, growth is likely to be slower than that experienced over the past two decades.

Population growth is instrumental to economic growth in B.C., with net-migration into the province being the major contributing factor to population growth. While short-term forecasts suggest that net in-migration will be below that experienced during the last decade, it is expected to rise in the long-run with the relative health of the B.C. economy and a larger population base. An average population growth of 2.2% per annum is projected for British Columbia over the next 25 years, considerably higher than the corresponding growth rate projected for Canada as a whole.

The Provincial Government's "Background Papers to the 1982 Budget" projected a 1.4% real growth in economic activity for 1982 following an estimated 2.0% growth in 1981. However, the actual 1982 rate of growth was negative, and only modest recovery is likely to continue for 1983. While in the past the B.C. economy has tended to outperform that of Canada, there are conflicting views as to whether this is likely to persist in future. The B.C. economy faces a number of structural problems that seem likely to limit growth prospects.

Resource sectors and supporting industries will likely be the dominant driving force behind the B.C. economy throughout the next two decades. Drawing on discussions with officials in the Ministry of Industry and Small Business Development, the province's various industrial sectors appear to have the following general outlook.

Forestry

Growth in the primary forest industry, logging, is expected to be quite modest. British Columbia will experience a significant decline in the acreage available for cutting timber in the long-term. Only by marginally increasing the yield, through more efficient harvesting techniques, will the logging industry be able to grow.

With regard to the lumber industry, problems of low market demand now dominate any difficulties that may exist with supply. Housing starts in the U.S., which had been expected to be in the 1.30 million range in 1982, actually reached only 1.07 million by year end. Since the U.S.A. accounted for almost 50% of B.C. lumber shipments in 1981, the result on B.C. lumber sales is clear.

There has been a steady shift away from single family to multiple family dwellings in the U.S. - from 77% in 1975 to 65% in 1981. Since a multiple family unit requires only about one third as much lumber as a single family unit, the impact on demand is substantial. Thus, it is unlikely that the recent peak lumber demand of 1978, when there were 2.0 million housing starts, may not be reached for several years.

The outlook for pulp and paper production is brighter, however. Supply constraints will not likely be as limiting and conversion to thermo-mechanical pulping techniques can improve output per volume of wood stock.

Mining

Production in B.C.'s mining sector fell significantly in 1982 due to the sensitivity of mineral resource markets to high interest rates. In the medium term, cyclical movements are anticipated to be very pronounced in metal and non-metal activity.

Coal production is projected to increase sharply in 1984 as North East Coal comes on stream. Long-term prospects for development of B.C.'s plentiful coal reserves are excellent. Constraints to development will primarily be due to transportation facilities, other capital structures, and environmental protection. As well, increased competition is likely to come from other markets of supply.

Metal mining output will fluctuate dramatically in the medium-term as markets and prices respond to rising and falling interest rates over the economic cycles. Stronger growth is anticipated in the long-term as prospects are good for developing B.C. metallic mineral resources.

Agriculture

Growth in primary agriculture will likely remain below the average growth rate for the provincial economy, primarily due to limitations on expanding the agricultural land base. The growth that does occur will likely be the result of increased productivity through more intensive utilization of existing agricultural land.

Fishing

Due to limited fish stocks, real growth in the fishing industry is expected to be only moderate over the long-term. However, significant increases in relative prices of fish caught in B.C. waters is expected to make a favourable contribution to the terms of trade.

Construction

Single family and multiple-family dwelling starts in B.C. are likely to fluctuate significantly in the medium-term, in accordance with interest rates and business cycles. Non-residential construction in the medium-term will likely lag economic recovery. Expansion of plant and equipment will be weak due to high real interest rates and market uncertainties. However, major capital projects such as the Vancouver Island gas pipeline, B.C. Place, north east coal development, etc. will add considerable activity to the construction sector.

Service Sector

Currently the service sector accounts for 63% of B.C.'s economic activity. Tourism in B.C. is expected to grow significantly during the forecast period, partly as a result of Expo '86, the Pier B.C. convention centre and cruise ship facility, and several recreational developments. This will contribute favourably to the service sector, both directly and indirectly through the multiplier effect. Overall, the service sector is likely to experience growth over the longer term, despite government restraint in Public Administration.

4.0 PERSPECTIVES ON VANCOUVER ISLAND*

Forestry

The forest industry is the mainstay of Vancouver Island's economy. Logging is prevalent almost everywhere and there are 32 paper mills, sawmills and plywood plants situated around the Island.

Planned increases in the output of the forest industry are either already underway or scheduled for the near future (3-4 years). Further expansion is highly unlikely. There is a general belief that on the Island, the forest industry is "mature", and will neither grow further nor generate significant growth in other economic activities.

In fact, a number of closures or consolidations of existing mills are likely:

- The existing MacMillan Bloedel sawmill at Chemainus (which accounted for 8% of the Island's lumber capacity) has been permanently closed.
- The B.C. Forest Products sawmill in Victoria (5% of Island lumber capacity) has been closed and sawmilling activities are to be shifted to Crofton or elsewhere.
- The sawmill at Honeymoon Bay was recently closed and dismantled.
- One of the existing MacMillan Bloedel sawmills in Port Alberni (8% of Island capacity) has been permanently closed.

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* Much of the material in this section has been taken directly from the report: A Study of the Projected Growth of the Economy of Vancouver Island 1981-2001 by Garth Edge International Inc. Victoria, B.C.: Ministry of Transportation and Highways. April 1981.

The decline in pulp and paper production has not been as severe as in lumber production. Nevertheless, the future of at least one major project, the Doman thermo-mechanical pulp mill at Duke Point is currently in doubt. The Edge report indicated that between 1980 and 1985 pulp and newsprint capacity on the Island would grow from 2.250 million to 2.815 million tonnes annually. Of the 565,000 tonne increase, 175,000 tonnes were accounted for by the now delayed Doman facility.

Pulp and paper production on the Island is expected to increase gradually to the level of the presently planned expansions, and thereafter remain at a steady state. By contrast, achievement of past levels of lumber production is not likely.

Mining

There are presently only two active mines on Vancouver Island. Western Mines Ltd. operates a zinc, copper, lead, silver, cadmium and gold mine at the southern end of Buttle Lake. A proposal to expand this mine is currently under Stage II review by the Environment and Land Use Committee. Utah Mines Ltd. operates a copper, molybdenum mine on Rupert Inlet. No significant changes in output levels are anticipated at this mine.

In terms of coal mining, the Quinsam Coal Project has recently received its Stage II approval from the Environmental and Land Use Committee. This open pit mine would produce thermal coal from a mine site located 27 km S.W. of Campbell River. Coal would be trucked to a barge facility to be constructed at Middle Bay. The only other active proposal is the Wolf Mountain Coal Project. This project would see the development of a small underground coal mine 10 km S.W. of Nanaimo.

While other new mineral discoveries are always possible, they cannot be anticipated. Thus other mining activities on Vancouver Island are generally expected to remain at current levels.

Agriculture

Agriculture is not a significant activity on the Island. The majority of people engaged in it are "hobby" farmers for whom livestock is the main pre-occupation.

Fishing

Fishing on a relatively small scale is widespread throughout the coastal communities. However, the industry is more concerned with maintaining its present size than with the possibility of expansion.

Manufacturing

Manufacturing activities on the Island are presently small and most are related to the forest industry. The prospects for growth, however, are promising. This outlook is based on the low cost attractiveness of Island locations for industrial parks in contrast to the much higher costs of establishing new plants in the Lower Mainland area of the province. On the other hand, while there is growth potential in the manufacturing sector, it would be unwise to exaggerate its possible size. Vancouver Island is on the periphery of provincial development, with all the disadvantages of separation from the rest of the province by water.

Tourism

Tourism is the second most important segment of the Vancouver Island economy, and one which is expected to show continuing modest growth in future. The physical attractiveness of the Island, through its landscape and by virtue of its separation by sea, brings tourists from afar.

Service Sector

Service industries account for a significant share of the Island's economic activities. These include industries such as transportation; communications; storage; the wholesale and retail trades; financial and insurance services; real estate; commercial, business and personal services; and lastly government and defence.

With a large number of retired people on the Island, it is not surprising that such "service" industries are large. The presence of the Provincial Government adds to the size of this sector. However, ultimately the "service" sector is dependent on the strength and wealth of the commercial, industrial and manufacturing sectors of the economy. Those who demand and pay for services must, in the first place, have created the wherewithal for such services. Growth in the service sector is expected to be modest throughout the forecast period.

Summary

In summary review: the forest industry is expected to recover from its current depressed situation but it is not likely to grow beyond its previous 1980 levels of activity; Mining activities are currently quite small but might expand into coal; Farming is only of a limited size with little economic growth being forecast; Fishing is struggling to maintain its existence;

Manufacturing has high hopes but still has to be established on a firm economic footing; Tourism is expanding although it is constrained by limited access to the Island. Major economic development projects which have been proposed recently on Vancouver Island are listed in Table B-5. Information in this table should be considered as approximate only, particularly for projects still in their early stages.

Superimposed on these economic activities are population pressures that are bringing more people to live on the Island. The western migration of people coming to British Columbia, and the mild weather, life-style and physical attractions of the west coast, are being translated into the movement of people onto Vancouver Island where land is cheaper than on the Mainland and the open life is more accessible. Such migration will, in itself, create economic pressures for growth, as is already now occurring from Victoria to Port Hardy.

Nanaimo and Campbell River are eagerly seeking out new industrial development. In their preparation for it, they are establishing industrial sites and they are experiencing an inrush of people requiring new residential home construction and new shopping centres. A boom condition is being experienced but still requires the growth of a supporting economic base in the not too distant future.

The economic base now supports an Island population of about 490,000 of whom about 240,000 are in the Victoria area, 50,000 in Nanaimo, and 55,000 in the area between Comox and Campbell River. In the next twenty years, it is forecast that the Island population will have increased to about 750,000, of whom about 325,000 will be in the Victoria area, 80,000 in Nanaimo and 100,000 in the Campbell River to Comox/Courtenay area. Detailed population figures and projections are provided in Appendix B-1.

TABLE B-5

INVENTORY OF MAJOR DEVELOPMENT PROJECTS ON VANCOUVER ISLAND

Project	Description	Investment $ Millions	Status
Cameron Island Nanaimo Redevelopment	Proposal for hotel, arts centre, museum, office buildings and residences	80 - 90	Active Proposal
Cheekye-Dunsmuir Power Line - B.C. Hydro	Land and underwater power transmission line under construction	740 - 800	Under Construction
Port Alberni - MacMillan Bloedel Ltd.	Upgrading of newsprint capacity in mill	23	Ongoing
Chemainus - MacMillan Bloedel Ltd.	Replacement of sawmill	94 - 117	On indefinite hold
Harmac Mill Boiler - MacMillan Bloedel Ltd.	New Chemical recovery boiler	92 - 115	On indefinite hold
Nanaimo Pulp Mill - Doman Industries Ltd.	Thermo-mechanical pulpmill utilizing wood waste	140	Delayed indefinitely
Wolf Mountain Coal Project Wolf Mountain Coal Co.	Underground mine located S.W. of Nanaimo	-	Designated small project
Quinsam Coal Project Weldwood & Brinco Mining	Open pit coal mine located S.W. of Campbell River	110	Stage II approval
Western Mines Extension Westmin Resources Ltd.	Open pit and underground lead/zinc mine located on Buttle Lake S.W. of Campbell River	150 - 212	Stage II review
New Privateer Gold Project Oakey Holdings Ltd.	Underground mine located N.E. of Zeballos	-	Exploration
Yreka Copper/Gold/Silver Project - Uke Resources Ltd.	Underground mine located in Newroutsos Inlet, N.W. of Alice Arm	-	Exploration
Southern Vancouver Island Natural Gas Pipeline - B.C. Hydro	Natural gas pipeline via southern route. Utility commission hearings to evaluate alternatives was released in February 1984	570	Active Proposal
Courtenay-Comox Sewerage System - Comox local municipalities	Collection system and secondary treatment plant	30	Ongoing

Source: Major Project Inventory, Office of Procurement and Industrial Benefits, May 1983, Ministry of Industry and Small Business Development.

C. AUTOMOBILE

C. AUTOMOBILE

1.0 ROAD NETWORK

The existing road network on Vancouver Island consists of more than 1,000 kilometers of highway linking the major communities, together with local arterial, collector and access roads within the urban and suburban areas. There is also an extensive system of unpaved, all-weather gravel roads to serve the needs of rural areas, remote communities, and the logging industry.

Major components of the road network on Vancouver Island are illustrated in Map 1. Stretching from the north end of the Island to its southern tip and generally following the eastern coastline is the main Island highway. From Port Hardy to Nanaimo (some 390 km) the road is referred to as Highway 19. The section north of Parksville is generally of a 2-lane standard, with short stretches of 3 or 4 lanes to provide passing opportunities. Between Parksville and Nanaimo the road consists of alternating 4-lane and 2-lane segments.

South of Nanaimo to Victoria, the road is called Highway 1 and over its 115 km length alternates between 2, 3 and 4-lane segments, except near Nanaimo and Victoria where the road widens to 6-lanes.

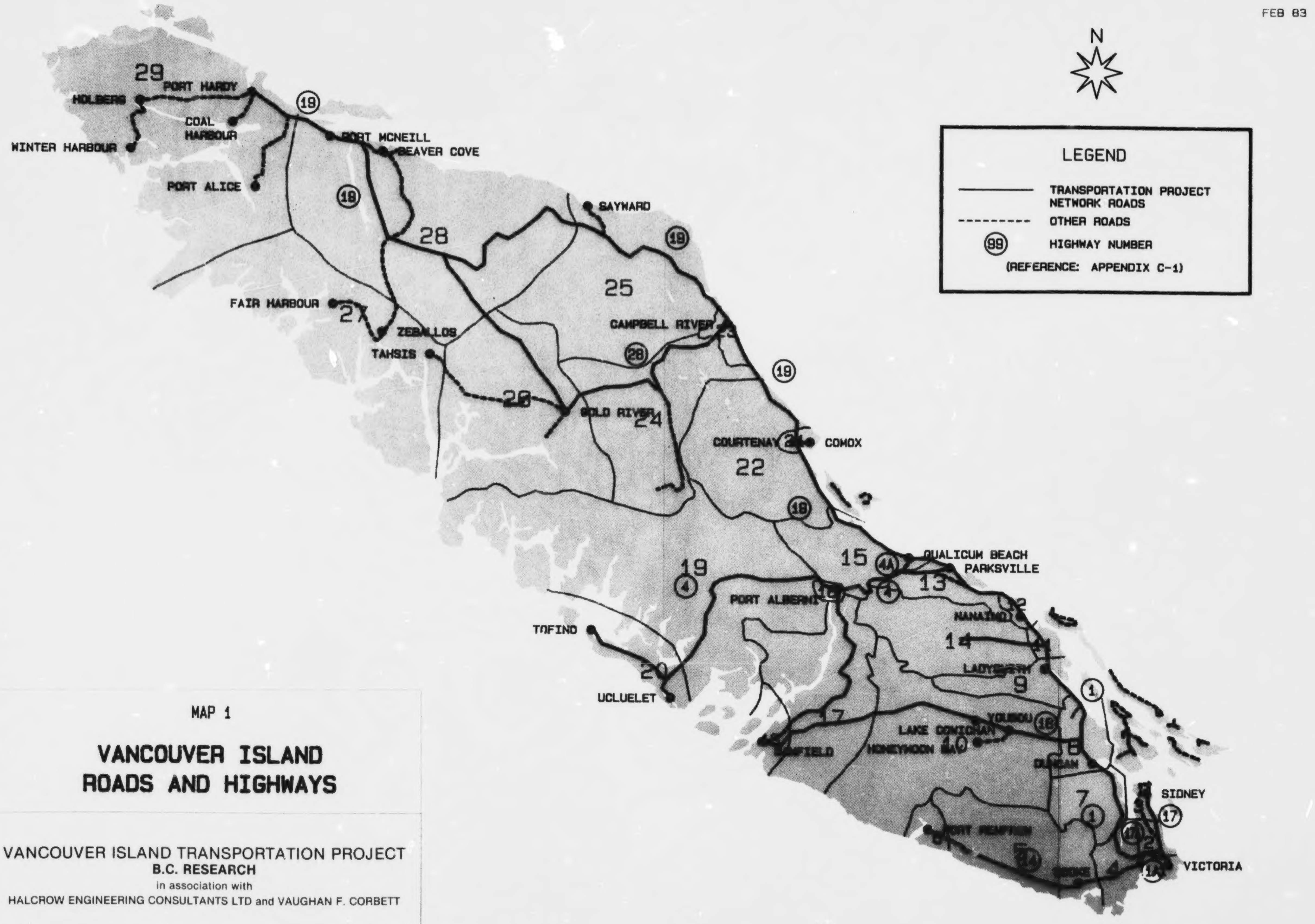
Branching off this main north-south link are Highways 28 to Gold River, 4 and 4A to Port Alberni and Tofino/Ucluelet, 18 to Lake Cowichan and Youbou, 14 to Sooke and Port Renfrew and finally 17 and 17-A to Sidney and Swartz Bay. These highways have a total length of approximately 530 km and are generally of a 2-lane paved standard, with short sections of additional lanes to facilitate passing. The one exception to this is Highway 17 from Victoria to Swartz Bay Ferry Terminal, which is generally a four lane, divided highway. Additional details of these main Provincial Highways are provided in Appendix C-1.

While Map 1 does not show the local arterial, collector and access roads serving the many communities on Vancouver Island, it does show most of the secondary roads and other main routes. Roads into Coal Harbour, Beaver Cove (from the north), Port Alice, Strathcona Park, the Nanaimo Lakes area, Honeymoon Bay and those on Denman, Hornby, Gabriola and the Gulf Islands are all good, paved roads. The stretches of road from Youbou to Bamfield, Bamfield to Port Alberni, Gold River to Tahsis, Gold River to Highway 19 and the roads into Zeballos, Fair Harbour, Beaver Cove (from the south), Holberg and Winter Harbour are all-weather, gravel roads.

Hundreds of kilometers of logging roads also criss-cross the Island, winding along river valleys and crossing the mountains of the Vancouver Island Ranges. These are rough roads of coarse gravel or dirt construction which have been cut through the forests to allow logging trucks access to logging areas. As these roads are generally not open to unrestricted public use, they are not shown on Map 1.

For the purposes of the current study, it was not possible or necessary to account for every detail in the road network on Vancouver Island. Instead, a simplified version was used. This simplified network is illustrated by the solid lines in Map 2 and includes all the Provincial Highways, together with most of the paved secondary roads and other main routes. A few additional links representing all-weather, gravel roads (e.g. from Youbou to Bamfield) and the continuation of the road system, via major ferry routes, have also been included.

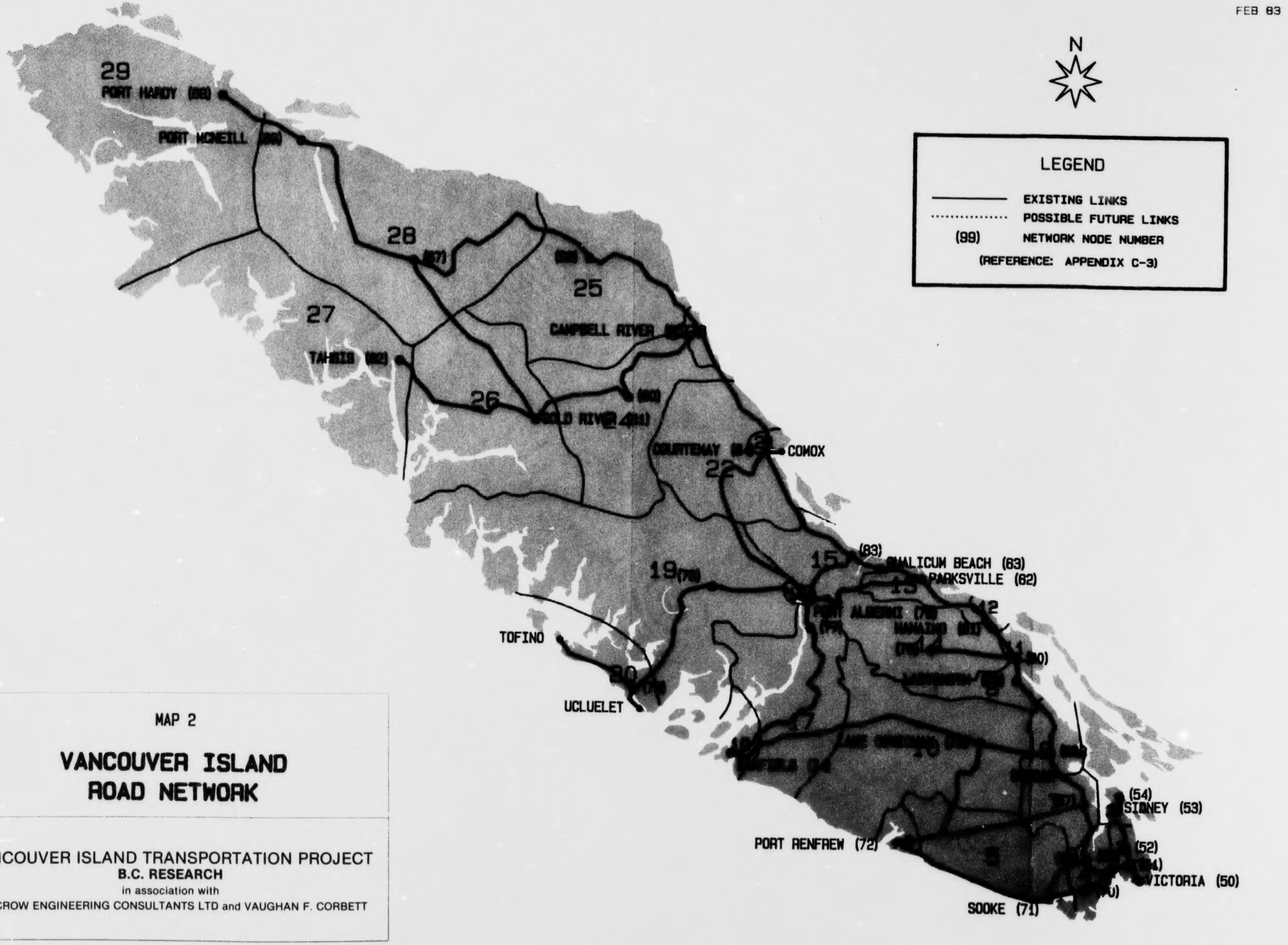
FEB 83


N
LEGEND
TRANSPORTATION PROJECT NETWORK ROADS
OTHER ROADS
99 HIGHWAY NUMBER
(REFERENCE: APPENDIX C-1)
29
PORT HARDY
HOLBERG
COAL HARBOUR
WINTER HARBOUR
PORT ALICE
19
PORT MCNEILL
BEAVER COVE
19
SAYWARD
28
19
25
FAIR HARBOUR
27
ZEBALLOS
TAHSIS
CAMPBELL RIVER
28
19
26
GOLD RIVER
24
COURTENAY
COMOX
22
19
15
4A
QUALICUM BEACH
PARKSVILLE
13
19
4
PORT ALBERNI
4
NANAIMO
TOFINO
14
LADYSMITH
9
1
20
UCLUELET
17
LAKE COWICHAN
YOUBOU
18
BAMFIELD
HONEYMOON BAY
10
DUNCAN
8
7
1
SIDNEY
17
PORT RENFREW
14
SOOKE
VICTORIA
1A

MAP 1

VANCOUVER ISLAND
ROADS AND HIGHWAYS

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT


FEB 83
N
LEGEND
EXISTING LINKS
POSSIBLE FUTURE LINKS
(99) NETWORK NODE NUMBER
(REFERENCE: APPENDIX C-3)
29
PORT HARDY
PORT MCNEILL
28
27
TAHSIS (82)
25
CAMPBELL RIVER
26
GOLD RIVER
COURTENAY
COMOX
22
19
15
(83)
QUALICUM BEACH (63)
PARKSVILLE (62)
13
12
PORT ALBERNI
NANAIMO
TOFINO
20
UCLUELET
PORT RENFREW (72)
(54)
SIDNEY (53)
(52)
VICTORIA (50)
SOOKE (71)

MAP 2

VANCOUVER ISLAND
ROAD NETWORK

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

Map 2 illustrates the Vancouver Island Road Network and the 34 network "nodes" used in the study. "Nodes" were selected to represent major communities and road intersections along the network. Most of the 29 geographic zones have only one such node, although a few zones have more than one. Nodes were numbered from 50 through 83 and these numbers were used to help identify particular segments of the road network. Thus, for example, the stretch of road between Lake Cowichan and Bamfield was referred to as Highway Link 73-74.

The network also included a few links which are not part of the existing road system on Vancouver Island. These were added to represent possible future links in the road network and are shown in Map 2 as dotted lines.

The physical capacity of the road system, in terms of the maximum numbers of vehicles per hour which can be accommodated safely, is dependant on a range of factors. Some of these factors are 'fixed' and related to the layout of the road itself, while others are 'variable' and related to characteristics of the traffic, traffic control devices, and other parameters which may alter or may be altered. A list of these factors is given in Table C-1.

According to conventional highway design practice, the number of vehicles which can be accommodated on standard 2-lane, 3-lane and 4-lane highways are in the order of 1,100 vehicles per hour per lane. However, officials within the Ministry of Transportation and Highways who are familiar with the highway system on Vancouver Island indicated that these figures are probably too low for these roads. In an attempt to establish a rough estimate of capacity which would be more appropriate for the Island, a brief survey was undertaken as part of the current study. The survey was done in November 1982 during a post-peak traffic period on a section of Highway 1 near Millstream (west of Victoria). Results of that survey are provided in Appendix C-2.

The survey results generally confirmed that the standard design values in Highway Capacity Manuals under-state the capacities achievable on Vancouver Island roads. For the purposes of this study, a higher capacity estimate of 1,300-1,500 vehicles per lane was used as the maximum. This equates to a daily two-way flow of 18-20,000 vehicles on two-lane roads in rural areas (assuming current daily flow patterns). This figure is intended only as a general 'yardstick' for comparing the capacity of the existing inter-urban network with actual usage of the system. The desirable design capacity of existing and new roads is lower than this figure and is dependent on a number of factors, as discussed previously.

TABLE C-1

FACTORS AFFECTING ROADWAY CAPACITY

Roadway Factors (Fixed)	Traffic Factors (Variable)
Roadway width/number of traffic lanes	Traffic lane distribution by direction
Lane width	Traffic composition
General clearance	Traffic signal settings
Presence (or not) of shoulders/medians	Traffic flow variations
Road alignment (curvature)	Parking characteristics
Road grades	Traffic control measures (speed zones, passing restrictions, parking controls)
Frequency of intersections/accesses	Traffic accidents/weather conditions

2.0 PASSENGER VEHICLE TRAFFIC

During the past few years the Ministry of Transportation and Highways has conducted a number roadside interview surveys of people travelling by car. In general, each survey established the trip origin and trip destination for each automobile and the place of residence of the driver. The surveys were carried out at various locations on the Vancouver Island highway network, in different years and over various lengths of time. While these surveys were not designed to provide overall origin-destination information for all inter-urban automobile traffic on Vancouver Island, it appeared possible that if the survey data were carefully combined, they might yield such a picture.

Thus, for the purposes of this study, origin-destination data from 10 roadside interview surveys were coded into the 29 geographic zones used for the project and into two categories of drivers: "Island Residents" and "Off Island Residents". The latter group included all drivers whose place of residence was other than Vancouver Island. The surveys were then combined into one overall matrix of automobile trips on Vancouver Island, which is shown in Tables C-2 and C-3. Details of the computational process used are provided in Appendix C-2.

Table C-2 gives origin-destination data for trips made by Island Residents while Table C-3 provides similar information for Off-Island Residents. Each column or row in these tables represents trips to or from a particular geographic zone. The values in the body of the table represent the average number of vehicle trips per day recorded between each pair of zones during the summer of 1980.

TABLE C-2

ORIGIN-DESTINATION TABLE -- ISLAND RESIDENTS
(SADT 1980, ZONE TO ZONE MOVEMENTS)

----- DESTINATION ZONES -----

----- ORIGIN ZONES -----	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	TOTAL
1	193709	53071	4153	12111	1875	49	628	474	96	140	12	267	131	22	83	173	23	7	23	77	100	21	92	15	8	10	7	16	91	3	3	74	819	52	97	6	267730
2	53071	45600	5731	6494	685	28	202	219	26	39	109	96	48	20	12	65	21	6	20	14	68	4	12	11	8	3	8	10	13	0	0	58	637	3	5	0	112618
3	4153	5731	27743	743	117	4	69	25	12	8	40	17	24	9	8	10	9	3	9	6	4	14	10	5	4	3	3	4	2	0	0	21	179	5	9	1	39004
4	12111	6494	743	23268	1143	51	223	114	8	17	66	74	21	13	8	22	11	3	11	8	8	8	15	6	5	5	4	5	5	0	0	20	166	5	9	1	44671
5	1875	685	117	1143	290	5	52	61	13	8	6	63	6	3	3	3	4	1	2	3	12	4	6	1	1	1	0	1	1	0	0	4	36	1	2	0	3393
6	49	28	4	51	5	32	3	5	2	1	1	5	1	0	1	2	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	2	2	0	0	0	189
7	628	202	69	223	52	3	1041	25	4	4	4	8	4	10	4	16	6	2	6	4	15	6	5	2	2	2	2	2	2	0	0	8	67	2	4	1	2429
8	474	219	25	114	61	5	25	2090	496	3	59	762	74	24	7	49	15	4	14	10	10	22	25	7	5	7	3	5	13	0	0	170	136	6	12	1	5752
9	96	26	12	8	13	2	4	496	1257	14	176	877	37	21	15	7	7	2	6	4	21	10	5	2	2	2	2	2	8	0	0	42	6	1	2	0	3185
10	140	39	8	17	8	1	4	3	14	320	18	81	14	6	6	10	3	2	3	2	3	6	9	2	1	1	1	1	1	0	0	26	4	1	2	0	757
11	12	109	40	66	6	1	4	59	176	18	345	703	26	19	12	7	5	1	4	3	10	11	7	2	2	2	1	1	2	0	0	31	4	1	2	0	1942
12	267	96	17	74	63	5	8	762	877	81	703	8518	1268	46	413	480	35	5	15	42	209	107	165	4	19	17	3	11	24	3	28	346	22	9	16	1	14747
13	131	48	24	21	6	1	4	74	37	14	26	1268	1367	7	80	527	10	2	10	24	73	39	35	5	4	4	2	3	13	0	6	58	8	1	2	0	3942
14	22	20	9	13	3	0	10	24	21	6	19	46	7	37	4	9	1	0	1	0	6	3	4	0	0	0	0	0	0	0	0	3	1	1	1	0	271
15	83	12	8	8	3	1	4	7	15	6	12	413	80	4	440	244	0	1	3	4	182	68	17	3	3	10	1	2	5	0	3	84	5	1	2	0	1670
16	173	65	10	22	3	2	16	49	7	10	7	480	527	9	244	2782	104	7	78	34	45	21	27	4	7	3	5	7	11	0	17	204	16	5	10	1	5014
17	23	21	9	11	4	0	6	15	7	3	5	35	10	1	0	104	48	2	4	2	15	0	9	0	0	0	0	0	1	0	0	33	2	1	1	0	416
18	7	6	3	3	1	0	2	4	2	2	1	5	2	0	1	7	2	28	1	0	2	1	2	0	0	0	0	0	0	0	0	5	1	1	1	0	82
19	23	20	9	11	2	0	6	14	6	3	4	15	10	1	3	78	4	1	78	8	14	7	9	1	1	0	0	0	1	0	0	33	2	1	1	0	344
20	77	14	6	8	3	0	4	10	4	2	3	42	24	0	4	34	2	0	8	108	14	3	5	0	0	0	0	2	5	0	0	28	2	1	2	0	415
21	100	68	4	8	12	1	15	10	21	3	10	209	73	6	182	45	15	2	14	14	2134	1124	793	147	19	42	3	22	63	4	42	146	6	2	4	1	5264
22	21	4	14	8	4	1	6	22	10	6	11	107	39	3	68	21	0	1	7	3	1124	333	82	15	10	7	4	8	13	3	22	79	3	1	2	0	2070
23	92	12	10	15	6	1	5	25	5	9	7	165	35	4	17	27	9	2	9	5	793	82	1940	180	241	135	17	58	158	3	13	178	7	2	4	0	4291
24	15	11	5	6	1	0	2	7	2	2	2	4	5	0	3	4	0	0	1	0	147	15	180	35	2	5	2	1	5	0	1	21	1	1	1	0	487
25	8	8	4	5	1	0	2	5	2	1	2	19	4	0	3	7	0	0	1	0	19	10	241	2	22	2	1	4	5	3	1	14	1	1	1	0	419
26	10	3	3	5	1	0	2	7	2	1	2	17	4	0	10	3	0	0	0	0	42	7	135	5	2	82	3	2	3	0	0	16	1	0	0	0	348
27	7	8	3	4	0	0	2	3	2	1	1	3	2	0	1	5	0	0	0	0	3	4	17	2	1	3	71	1	2	0	0	8	1	1	1	0	157
28	16	10	4	5	1	0	2	5	2	1	1	11	3	0	2	7	0	0	0	2	22	8	58	1	4	2	1	179	2	6	0	11	1	0	0	0	347
29	91	13	2	5	1	0	2	13	8	1	2	24	13	0	5	11	1	0	1	5	63	13	158	5	5	3	2	2	244	0	0	24	3	1	1	0	730
30	3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	4	3	3	0	3	0	0	6	0	0	0	0	0	0	0	0	33
31	3	0	0	0	0	0	0	0	0	0	0	28	6	0	3	17	0	0	0	0	42	22	13	1	1	0	0	0	0	0	0	0	0	0	0	0	136
32	74	58	21	20	4	2	8	170	42	26	31	346	58	3	84	204	33	5	33	28	146	79	178	21	14	16	8	11	24	0	0	0	0	0	0	0	1827
33	819	637	179	166	31	2	67	136	6	4	4	22	8	1	5	16	2	1	2	2	6	3	7	1	1	1	1	1	3	0	0	0	0	0	0	0	2134
34	54	3	5	5	1	0	2	6	1	1	1	9	1	1	1	5	1	1	1	1	2	1	2	1	1	0	1	0	1	0	0	0	0	0	0	0	107
35	97	5	9	9	2	0	4	12	2	2	2	16	2	1	2	10	1	1	1	2	4	2	4	1	1	0	1	0	1	0	0	0	0	0	0	0	194
36	6	0	1	1	0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13
TOTAL	267740	112618	39004	44671	3380	189	2429	5752	3185	757	1942	14747	3942	271	1670	5014	416	82	344	415	5264	2070	4291	487	419	348	157	347	730	33	136	1827	2139	107	194	13	0

1 Victoria/Esquimalt/Oak Bay
2 Saanich
3 C & N Saanich/Sidney/Saltspring & Outer Gulf Is.
4 Colwood/Langford/Metchosin/View Royal
5 Sooke
6 Port Renfrew
7 Shawnigan
8 Duncan/N. Cowichan/Chemainus
9 Ladysmith
10 Lake Cowichan/Youbou
11 Cassidy/Gabriola
12 Nanaimo
13 Parksville
14 Nanaimo (rural)
15 Qualicum Beach
16 Port Alberni
17 Nitinat
18 Bamfield
19 Effingham
20 Tofino/Ucluelet
21 Courtenay/Comox
22 Cumberland
23 Campbell River
24 Strathcona (rural)
25 Sayward
26 Gold River
27 Tahsis/Zeballos
28 Port McNeil
29 Port Hardy/Port Alice
30 Port Hardy to Northern B.C. Ferry
31 Courtenay to Powell River Ferry
32 Nanaimo to Horseshoe Bay Ferry
33 Schwartz Bay to Tsawwassen Ferry
34 Sidney to Anacortes Ferry
35 Victoria to Port Angeles Ferry
36 Victoria to Seattle Ferry

TABLE C-3

ORIGIN-DESTINATION TABLE -- OFF-ISLAND RESIDENTS
(SADT 1980, ZONE TO ZONE MOVEMENTS)

----- DESTINATION ZONES -----

----- ORIGIN ZONES -----

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	TOTAL
1	23942	4560	512	1095	132	6	65	87	25	4	4	153	40	2	35	17	1	2	4	17	26	12	40	2	2	3	2	3	13	2	2	32	351	52	98	7	33750
2	4560	5573	707	804	50	4	12	17	14	9	0	43	4	1	0	10	1	1	2	4	13	7	2	2	2	1	1	2	3	0	0	25	273	3	5	1	14100
3	512	707	3430	92	13	0	25	43	9	8	4	43	4	0	0	7	0	0	2	3	4	5	6	1	1	1	1	1	2	0	0	9	77	5	9	1	5033
4	1095	804	92	2074	140	6	21	4	4	4	7	17	12	1	4	0	0	0	2	3	7	5	6	1	1	1	1	1	2	0	0	9	71	5	9	1	5410
5	132	50	13	140	42	0	7	4	4	2	2	0	4	0	4	3	0	0	0	1	12	2	2	0	0	0	0	0	1	0	0	2	16	1	2	1	443
6	6	4	0	6	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	19
7	65	12	25	21	7	0	98	30	11	7	6	0	7	0	5	6	0	0	1	2	4	4	4	1	1	1	0	1	1	0	0	4	29	2	4	1	348
8	87	17	43	4	4	0	30	229	10	17	3	7	14	1	10	3	1	1	2	7	9	7	8	2	1	1	1	1	2	0	0	73	50	6	22	1	682
9	25	14	9	4	4	0	11	10	120	6	26	32	11	1	10	8	0	0	1	3	5	5	3	1	1	1	0	1	1	0	0	10	3	1	2	1	331
10	4	9	8	4	2	0	7	17	6	24	3	8	3	0	3	3	0	0	0	1	3	2	2	0	0	0	0	0	1	0	0	11	2	1	2	0	126
11	4	0	4	7	2	0	6	3	26	3	37	0	0	1	5	5	0	0	1	1	4	3	3	1	0	0	0	0	1	0	0	13	2	1	2	0	153
12	153	43	43	17	0	0	0	7	32	8	0	409	53	2	10	21	1	1	4	15	10	10	30	3	2	2	1	2	3	2	12	140	9	9	16	1	1103
13	40	4	4	12	4	0	7	14	11	3	0	53	240	1	44	10	2	1	4	14	4	14	5	3	2	3	1	2	5	0	2	25	4	1	2	1	586
14	2	1	0	1	0	0	0	1	1	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	1	0	15
15	35	0	0	4	4	0	5	10	10	3	5	10	44	0	120	14	1	0	3	21	9	24	5	2	2	1	1	1	2	0	2	36	2	1	2	1	396
16	17	10	7	0	3	0	6	3	8	3	5	21	10	0	14	210	3	1	7	3	12	3	12	2	2	1	1	1	2	0	7	122	7	5	10	1	527
17	1	1	0	0	0	0	0	1	0	0	0	1	2	0	1	3	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	14	1	1	1	0	30
18	2	1	0	0	0	0	0	1	0	0	0	1	1	0	0	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	1	0	15
19	4	2	2	2	0	0	1	2	1	0	1	4	4	0	3	7	0	0	10	4	2	2	2	0	0	0	0	0	0	0	0	14	1	1	1	0	70
20	17	4	3	3	1	0	2	7	3	1	1	15	14	0	21	3	0	0	4	49	10	3	12	1	0	0	0	0	1	0	0	12	1	1	2	0	191
21	26	13	4	7	12	0	4	9	5	3	4	10	4	0	9	12	1	0	2	10	226	32	52	25	4	3	2	3	4	2	10	63	3	2	4	1	573
22	12	7	5	5	2	0	4	7	5	2	3	10	14	0	24	3	0	0	2	3	32	70	7	4	3	2	1	2	3	2	9	34	1	1	2	1	282
23	40	2	6	6	2	0	4	8	2	2	3	30	5	0	5	12	1	0	2	12	52	7	272	10	7	14	3	4	10	1	5	76	3	3	5	1	615
24	2	2	1	1	0	0	1	2	1	0	1	3	3	0	2	2	0	0	0	1	25	4	10	12	1	2	1	1	1	0	1	9	1	1	1	0	92
25	2	2	1	1	0	0	1	1	1	0	0	2	2	0	2	2	0	0	0	0	4	3	7	1	0	1	0	1	2	1	0	6	0	1	1	0	53
26	3	1	1	1	0	0	1	1	1	0	0	2	3	0	1	1	0	0	0	0	3	2	14	2	1	15	1	1	1	0	0	7	0	0	0	0	63
27	2	1	1	1	0	0	0	1	0	0	0	1	1	0	1	1	0	0	0	0	2	1	3	1	0	1	9	0	1	0	0	4	0	1	1	0	34
28	3	2	1	1	0	0	1	1	1	0	0	2	2	0	1	1	0	0	0	0	3	2	4	1	1	1	0	25	7	3	0	5	1	0	0	0	69
29	13	3	2	2	1	0	1	2	1	1	1	3	5	0	2	2	0	0	0	1	4	3	10	1	2	1	1	7	49	4	0	10	1	1	1	0	135
30	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	2	1	0	1	0	0	3	4	0	0	0	0	0	0	0	17
31	2	0	0	0	0	0	0	0	0	0	0	12	2	0	2	7	0	0	0	0	10	9	5	1	0	0	0	0	0	0	0	0	0	0	0	0	50
32	32	25	9	9	2	1	4	73	10	11	13	140	25	2	36	122	14	2	14	12	63	34	76	9	6	7	4	5	10	0	0	0	0	0	0	0	784
33	351	273	77	71	16	1	29	50	3	2	2	9	4	0	2	7	1	0	1	1	3	1	3	1	0	0	0	1	1	0	0	0	0	0	0	0	910
34	52	3	5	5	1	0	2	6	1	1	1	9	1	1	1	5	1	1	1	1	2	1	3	1	1	0	1	0	1	0	0	0	0	0	0	0	108
35	98	5	9	9	2	0	4	22	2	2	2	16	2	1	2	10	1	1	1	2	4	2	5	1	1	0	1	0	1	0	0	0	0	0	0	0	206
36	7	1	1	1	1	0	1	1	1	0	0	1	1	0	1	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	21
TOTAL	33750	14100	5033	5410	443	19	348	682	331	126	153	1103	586	15	396	527	30	15	70	191	573	282	615	92	53	63	34	69	135	17	50	784	910	108	206	21	0

1	Victoria/Esquimalt/Oak Bay	13	Parksville	25	Sayward
2	Saanich	14	Nanaimo (rural)	26	Gold River
3	C & N Saanich/Sidney/Saltspring & Outer Gulf Is.	15	Qualicum Beach	27	Tahsis/Zeballos
4	Colwood/Langford/Metchosin/View Royal	16	Port Alberni	28	Port McNeil
5	Sooke	17	Nitinat	29	Port Hardy/Port Alice
6	Port Renfrew	18	Bamfield	30	Port Hardy to Northern B.C. Ferry
7	Shawnigan	19	Effingham	31	Courtenay to Powell River Ferry
8	Duncan/N. Cowichan/Chemainus	20	Tofino/Ucluelet	32	Nanaimo to Horseshoe Bay Ferry
9	Ladysmith	21	Courtenay/Comox	33	Schwartz Bay to Tsawwassen Ferry
10	Lake Cowichan/Youbou	22	Cumberland	34	Sidney to Anacortes Ferry
11	Cassidy/Gabriola	23	Campbell River	35	Victoria to Port Angeles Ferry
12	Nanaimo	24	Strathcona (rural)	36	Victoria to Seattle Ferry

To ensure that the overall origin-destination Tables C-2 and C-3 were a fair representation of vehicle traffic in the summer of 1980, the vehicle trips listed in these tables were assigned, by computer, to the appropriate links in the road network. These estimated traffic flows were then compared with the Ministry of Transportation and Highways' automatic traffic counts for corresponding links (see Table C-4).

It should be noted that the estimated traffic flows which were derived from the origin-destination data excluded all buses and trucks, since the original roadside interviews omitted these vehicle types. Also, these estimates do not fully include the local, intra-zonal traffic (i.e. traffic which stays entirely within a zone) since the computerized assignment process deals only with traffic between zones. The Ministry of Transporation and Highways' traffic counts, on the other hand, include trucks, buses and intra-zonal traffic. While the inclusion of trucks and buses would increase counts by less than 4% in most locations, the impact of local, intra-zonal traffic can be quite significant: Ministry of Transporation and Highways' traffic counts often vary by as much as 30 to 50% at different points along the same highway link.

Given such limitations, discrepancies between the two sets of traffic figures, shown in Table C-4, are not surprising. However, the general pattern of high and low traffic volumes matches extremely well, the average discrepancy being only 1.6%. While there were a few links with sizable discrepancies, the comparison between estimated and observed traffic flows was considered sufficiently accurate for the purposes of the current study. Nevertheless, the size of the discrepancy must be kept in mind when interpreting the impact of projected traffic levels on each link.

TABLE C-4

ESTIMATED TRAFFIC ON MAJOR HIGHWAY LINKS
WITH A COMPARISON TO MINISTRY OF TRANSPORTATION AND HIGHWAYS' TRAFFIC COUNTS
(Summer Average Daily Traffic 1980)

Highway Link		Island Residents	Off-Island Residents	Total	M.O.T.H. Traffic Counts**	% Discrepancy
50-51	Victoria-Junction 17 & 1	148,062	19,666	167,728	N/A	N/A
51-52	Junction 17 & 1-Hwy 17 (Sannich)	135,827	18,212	154,039	N/A	N/A
51-55	1 & 1A Corridor from Hwy 17 to 14	51,445	7,914	59,359	56,000	6.0
52-53	Hwy 17 (Sannich)-Sidney	26,275	4,930	31,205	36,400	-14.3
53-54	Sidney-Swartz Bay	4,273	1,836	6,109	10,900	-44.0
55-56	Junction 1 & 14-Goldstream	9,340	2,610	11,950	14,500	-17.6
55-70	Junction 1 & 14-Colwood	43,165	5,540	48,705	33,800	44.1
56-57	Goldsteam-Malahat	10,700	2,852	13,552	14,000	-3.2
56-71*	Goldstream-Sooke	-	-	-	-	-
57-58	Malahat-Junction 1 & 18	8,472	2,728	11,200	9,100	23.1
57-72*	Malahat-Port Renfrew	-	-	-	-	-
58-59	Junction 1 & 18-Ladysmith	9,794	2,514	12,308	12,500	-1.5
58-73	Junction 1 & 18-Lake Cowichan	934	216	1,150	4,200	-72.6
59-60	Ladysmith-Cassidy	10,922	2,576	13,498	12,600	7.1
60-61	Cassidy-Nanaimo	11,648	2,552	14,200	15,200	-6.6
60-75	Cassidy-Nanaimo (rural)	468	28	496	N/A	N/A
61-62	Nanaimo-Parksville	12,112	2,668	14,780	14,800	0.1
62-63	Parksville-Qualicum Beach	6,924	1,930	8,854	13,400	-33.9
62-76	Parksville-Port Alberni	5,446	1,034	6,480	7,300	-11.2
63-83	Qualicum Beach-Hwy 19 (near Bowser)	5,336	1,574	6,910	6,600	4.7
83-64	Hwy 19 (near Bowser)-Courtenay					
64-65	Courtenay-Campbell River	5,082	1,064	6,146	9,000	-31.7
64-76*	Courtenay-Port Alberni	-	-	-	-	-
65-66	Campbell River-Hwy 19 (Sayward)	2,080	306	2,386	2,100	13.6
65-80	Campbell River-Hwy 28 (Strathcona)	1,592	284	1,876	N/A	N/A
66-67	Hwy 19 (Sayward)-Woss	1,334	232	1,566	2,100	-25.4
67-68	Woss-Port McNeill	1,350	238	1,588	N/A	N/A
67-81	Woss-Gold River	16	6	22	N/A	N/A
68-69	Port McNeill-Port Hardy	1,006	190	1,196	N/A	N/A
70-71	Colwood-Sooke	6,495	878	7,373	7,300	1.0
71-72	Sooke-Port Renfrew	314	36	350	N/A	N/A
72-73*	Port Renfrew-Lake Cowichan	-	-	-	-	-
73-74	Lake Cowichan-Bamfield	68	12	80	N/A	N/A
74-77	Bamfield-Nitinat	56	10	66	N/A	N/A
76-77	Port Alberni-Nitinat	744	68	812	N/A	N/A
76-78	Port Alberni-Hwy 4 (Effingham)	1,158	388	1,546	1,500	3.1
76-83*	Port Alberni-Dunsmuir	-	-	-	-	-
78-79	Hwy 4 (Effingham)-Hwy 4 Tofino/Ucluelet	614	284	898	1,500	-40.0
80-81	Hwy 28 (Strathcona)-Gold River	716	136	852	720	18.3
81-82	Gold River-Tahsis	172	50	222	N/A	N/A
69-30	Port Hardy-Prince Rupert Ferry	66	34	100	100	0.0
64-31	Courtenay-Powell River Ferry	272	116	388	420	-7.6
61-32	Nanaimo-Horseshoe Bay Ferry	3,654	1,572	5,226	5,300	-1.4
54-33	Swartz Bay-Tsawwassen Ferry	4,273	1,836	6,109	6,200	-1.5
53-34	Sidney-Anacortes Ferry	216	216	432	217	99.1
50-35	Victoria-Port Angeles Ferry	388	412	800	756	5.8
50-36	Victoria-Seattle Ferry	26	42	68	N/A	N/A
						Weighted Avg. -1.6%

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* Possible future highway links.

** Ministry of Transporation & Highways' traffic counts for summer 1980 (including trucks and buses).

The estimated daily automobile traffic flows (summer 1980) are illustrated in Maps 3 and 4. Map 3 shows the complete Island road network and highlights the major corridor of travel between Victoria and Campbell River. The scale on this map was chosen so that volume differences on the smaller links would be observable; as a result, it under-represents the volumes in the Victoria area. Map 4, which is scaled in proportion to traffic, clearly illustrates the relatively high volumes in this area.

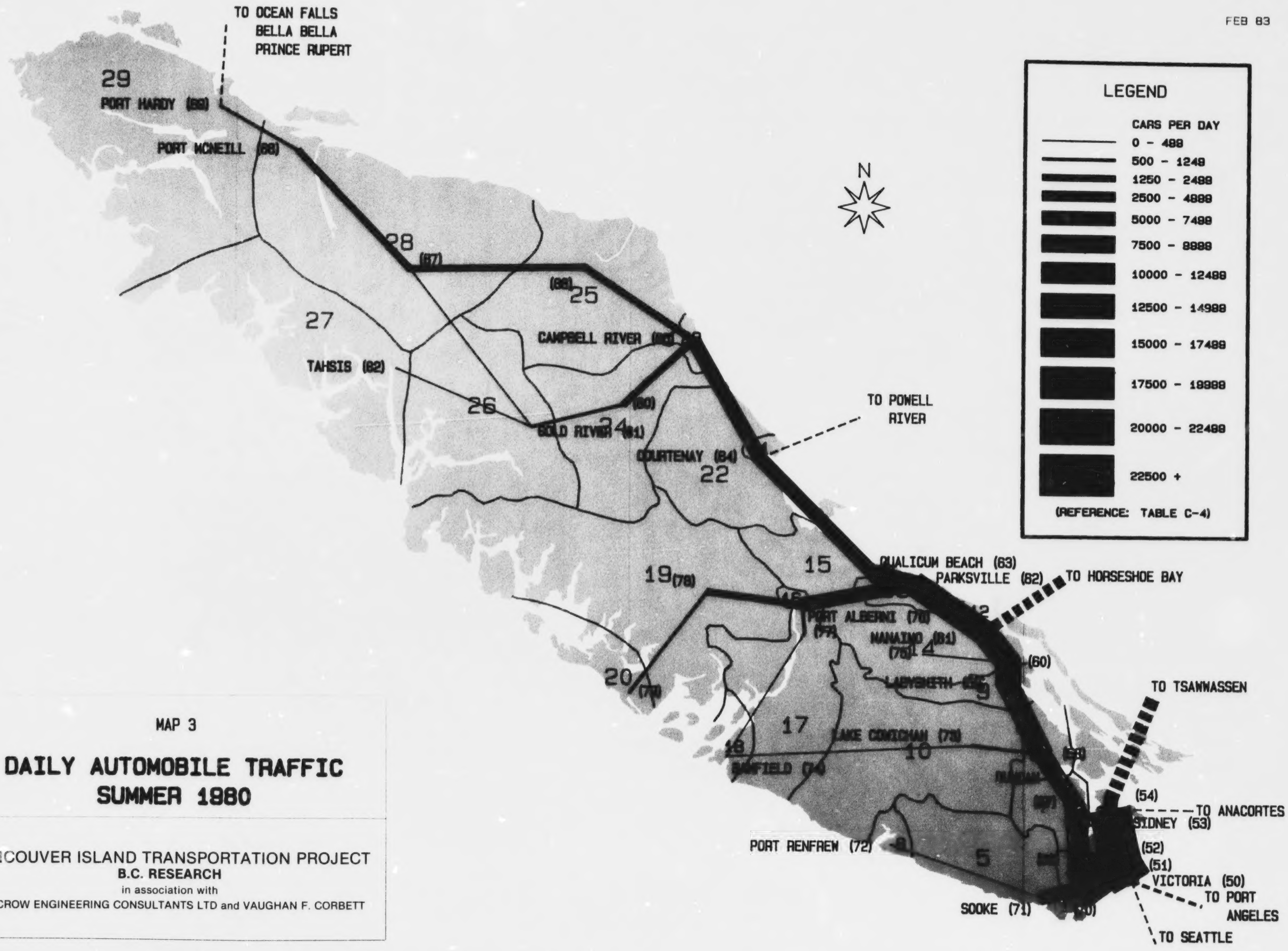
2.1 Intra-Zonal Traffic

Intra-zonal trips are those which are made entirely within a single geographic zone.

In general, the highest road traffic volumes will not occur between major communities, but rather within them. Total traffic activity is generated by through trips, trips to other zones either starting or ending in the community, and intrazonal traffic having both trip origin and destination within the community.

As mentioned previously, the computerized process in this study dealt only with trips between zones. Thus, intra-zonal traffic was not included in the traffic patterns of Maps 3 and 4.

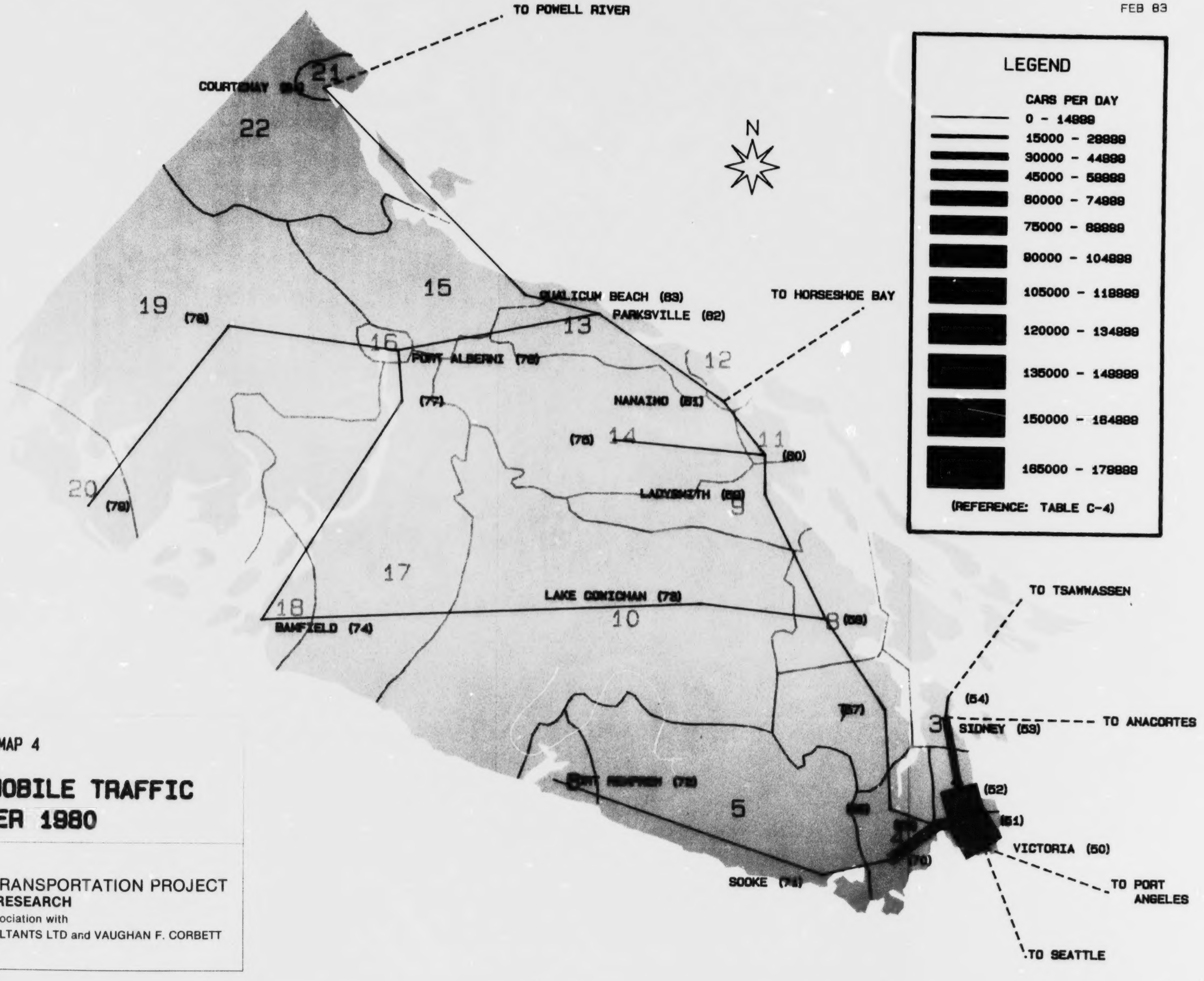
While the origin-destination information in Tables C-2 and C-3 contains some intra-zonal trips, these counts are incomplete. The rural locations of most of the roadside interview surveys on which these tables are based means that they could yield only partial information about local traffic within the various communities. Thus, intra-zonal traffic volumes were examined entirely outside the computational process described earlier in this Chapter.


FEB 83
TO OCEAN FALLS
BELLA BELLA
PRINCE RUPERT
29
PORT HARDY (69)
PORT MCNEILL (68)
28 (67)
(66) 25
27
CAMPBELL RIVER (65)
TAHSIS (62)
26
(80)
GOLD RIVER (81)
24
COURTENAY (64)
22
TO POWELL RIVER
19 (78)
15
QUALICUM BEACH (63)
PARKSVILLE (62)
TO HORSESHOE BAY
16
PORT ALBERNI (76)
(77)
12
NANAIMO (61)
(75) 14
(60)
LADYSMITH
9
20 (79)
17
LAKE COWICHAN (73)
18
10
BAMFIELD (74)
DUNCAN
(57)
TO TSAWWASSEN
(54)
TO ANACORTES
SIDNEY (53)
(52)
(51)
VICTORIA (50)
TO PORT ANGELES
TO SEATTLE
PORT RENFREW (72)
8
5
SOOKE (71)
(70)
N
LEGEND
CARS PER DAY
0 - 499
500 - 1249
1250 - 2499
2500 - 4999
5000 - 7499
7500 - 9999
10000 - 12499
12500 - 14999
15000 - 17499
17500 - 19999
20000 - 22499
22500 +
(REFERENCE: TABLE C-4)

MAP 3

DAILY AUTOMOBILE TRAFFIC SUMMER 1980

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT


FEB 83
TO POWELL RIVER
COURTENAY (84)
21
22
19
(78)
15
QUALICUM BEACH (83)
PARKSVILLE (82)
TO HORSESHOE BAY
13
16
PORT ALBERNI (78)
12
(77)
NANAIMO (81)
(76)
14
11
(80)
20
(79)
LADYSMITH (59)
9
17
18
BAMFIELD (74)
LAKE COWICHAN (73)
10
8
(58)
TO TSAWWASSEN
(57)
(54)
3
TO ANACORTES
SIDNEY (53)
PORT RENFREW (72)
5
(52)
(51)
VICTORIA (50)
(70)
SOOKE (71)
TO PORT ANGELES
TO SEATTLE
N
LEGEND
CARS PER DAY
0 - 14999
15000 - 29999
30000 - 44999
45000 - 59999
60000 - 74999
75000 - 89999
90000 - 104999
105000 - 119999
120000 - 134999
135000 - 149999
150000 - 164999
165000 - 179999
(REFERENCE: TABLE C-4)

MAP 4

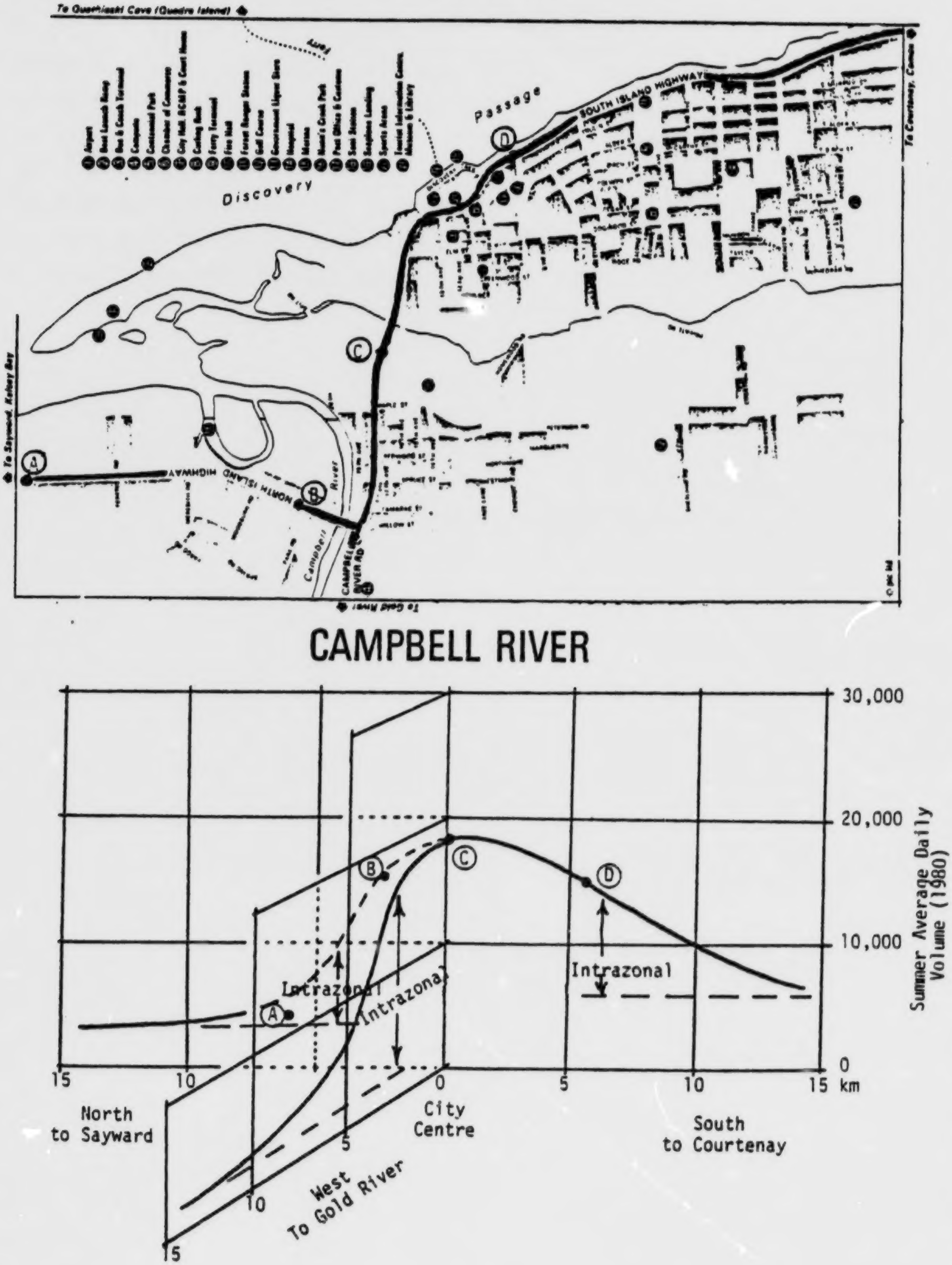
DAILY AUTOMOBILE TRAFFIC
SUMMER 1980

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

To estimate the volume of intra-zonal traffic, separate analyses were made of the traffic data available for each of the major communities on Vancouver Island (except Victoria). Ministry of Transporation and Highways' traffic counts were plotted according to their distance from the centres of communities. Curves were then developed to illustrate how traffic volumes on the highway system decline from their peaks near the centres of urban areas toward their edges.

The pattern for Campbell River is shown in Figure C-1. Patterns for the other major communities examined appear in Appendix C-4. The difference between the peak volume at the centre of a community and the lower volume at its edges was assumed to be the result of intra-zonal traffic.

FIGURE C-1
INTRA-ZONAL TRAFFIC FLOWS: CAMPBELL RIVER



3.0 TRAFFIC TRENDS ON THE NETWORK

3.1 Highway Traffic Flows

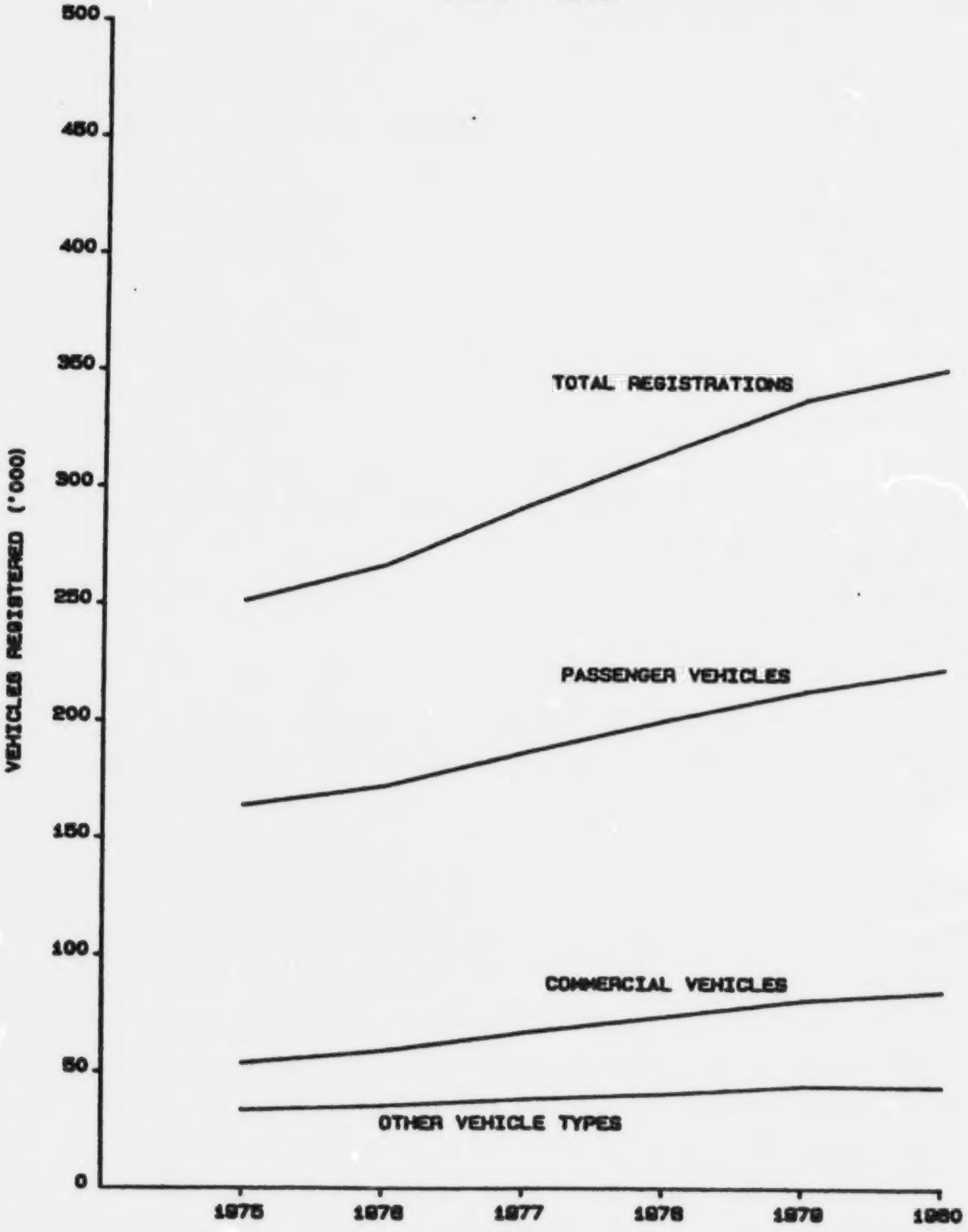
Map 5 illustrates trends over the last 5 years in vehicle traffic on the highway network of Vancouver Island, and on main ferry routes to and from the Island. In general terms, average daily traffic during the summer has shown a steady increase on major routes in the Victoria area, on Highways 1 and 17, and on Highway 19 up to the Courtenay area.

Highway 19 north of Courtenay has shown a significant drop in traffic between 1980 and 1981. Routes serving communities in the centre, the north end of the Island and on the west coast have shown little or no growth in average summer traffic over the last few years.

3.2 Vehicle Registrations

Figure C-2 illustrates trends in vehicle ownership, on Vancouver Island, by type of vehicle, over the years from 1975 to 1980. Passenger car ownership grew at an average annual rate of 6% during this period. However, since 1977 the growth rate has slowed considerably, from a high of 8.1% between 1976-1977 to only 4.4% between 1979-1980. This may have been caused not only by economic factors, but also by car ownership approaching a saturation level. Vancouver Island is becoming a favoured retirement area (i.e. having an aging population without the need for multiple vehicles in the family unit). The ownership rate is already at a level of 0.49 cars per capita (as of 1980), which represents approximately 4 cars for every 5 people between the ages of 18 and 65. It is considered unlikely that vehicle ownership will continue to grow at a rate exceeding that of the general population.

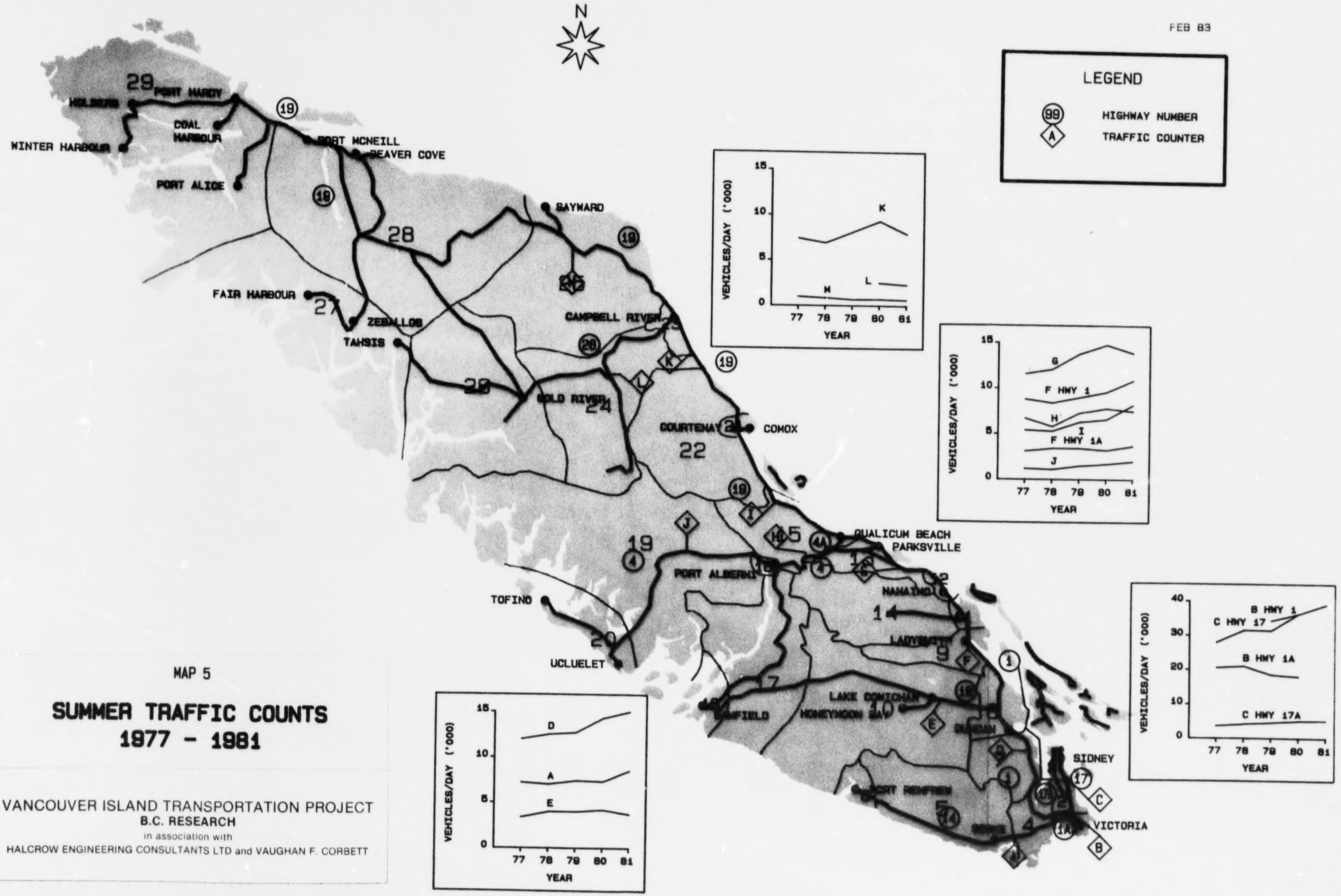
FIGURE C-2
VEHICLE REGISTRATIONS ON VANCOUVER ISLAND
(1975 - 1980)



REFERENCE: B.C. MOTOR VEHICLE BRANCH

B.C. RESEARCH

FEB 83


N
LEGEND
99 HIGHWAY NUMBER
A TRAFFIC COUNTER
HOLBERG
PORT HARDY
WINTER HARBOUR
COAL HARBOUR
PORT ALICE
PORT MCNEILL
BEAVER COVE
SAYWARD
FAIR HARBOUR
ZEBALLOS
TAHSIS
CAMPBELL RIVER
GOLD RIVER
COURTENAY
COMOX
QUALICUM BEACH
PARKSVILLE
PORT ALBERNI
NANAIMO
TOFINO
UCLUELET
LADYSMITH
LAKE COWICHAN
HONEYMOON BAY
BAMFIELD
DUNCAN
PORT RENFREW
SOOKE
SIDNEY
VICTORIA
29
28
27
26
24
22
20
19
15
14
10
9
7
5
4
2
VEHICLES/DAY ('000)
YEAR
77 78 79 80 81
K
L
M
G
F HWY 1
H
I
F HWY 1A
J
B HWY 1
C HWY 17
B HWY 1A
C HWY 17A
D
A
E

MAP 5

SUMMER TRAFFIC COUNTS 1977 - 1981

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

Due to the incompatibility between this Project's traffic zones and the Districts used in tabulating vehicle licence records, it was not practical to examine vehicle ownership growth rates at a zonal level. A cursory study of parts of the Island was undertaken, however, which has lead to the following observations:

- in 1975 the greater Victoria area (including Esquimalt, Sooke, Central/North Saanich, etc.) accounted for approximately 52% of all passenger vehicles licensed on Vancouver Island. By comparison, this area made up 51% of the Island's population in 1976. By 1980, however, the area's vehicle registrations represented only 48% of the Island total, and its 1981 population was down to 49% of the Island total. Thus, in terms of both vehicle registrations and total population, other areas of Vancouver Island had faster rates of growth than did the southern tip of the Island.

- while by no means identical, the geographical distribution of growth in passenger vehicle ownership from 1975 to 1980 was generally similar to population growth in that period (see Table C-5). Areas having high populaton growth had high vehicle ownership growth rates and vice versa.

- commercial vehicles, including panel trucks, vans and half-ton pick-ups, constitute about 25 percent of total vehicle registration on Vancouver Island, a percentage which has remained relatively constant in the 1975-1980 period.

- in the Victoria and Central/North Saanich areas, about 3 passenger vehicles were registered to every commercial vehicle in 1980. Elsewhere on the Island, passenger vehicles outnumbered commercial vehicles by margins of 2:1 or less.

TABLE C-5

COMPARISON OF VEHICLES REGISTRATION AND TOTAL POPULATION AVERAGE ANNUAL GROWTH RATES

	VEHICLE REGISTRATION 1975-1980	TOTAL POPULATION 1976-1981
Victoria	4.2%	1.0%
Central/Saanich	10.0%	3.9%
Soobe	12.5%	2.5%
Ladysmith/Chemainus/Duncan	7.3%	2.5%
Nanaimo	7.6%	3.4%
Parksville/Qualicum Beach	12.7%	8.5%
Courtenay/Comox	7.6%	3.7%
Campbell River	8.5%	3.9%
Vancouver Island North	8.5%	3.4%

Notwithstanding the higher growth rates in the recent past for vehicle ownership as compared to population growth, the following observations generally support the notion of using population growth as the basis for traffic projections: geographic distributions and differential growth rates are similar; vehicle ownership may well be approaching a saturation level on Vancouver Island; even if it is not, once a level of one car per person of driving age is attained, further increases in vehicle ownership will not increase traffic volumes.

3.3 Traffic Accidents on the Highway Network

A limited investigation of traffic accidents which occurred on the Vancouver Island highway network in the years 1979, 1980, 1981 and 1982 (Jan-March only) was also undertaken. Table C-6 gives the results of an analysis of the road network, on a link-by-link basis. It shows 1980 SADT flows on each link, total accidents (1979-82), accidents per kilometer of highway, and accidents per million vehicle kilometers travelled.

The analysis indicates that the sections of road with the highest numbers of accidents per km and the highest numbers of accidents per million vehicle kilometers travelled are:

- Highway 17, from Sidney to Swartz Bay
- Highway 1A, from the Gorge Bridge, Victoria to Highway 1 at Goldstream
- Highway 14, from Colwood Corners to Sooke
- Highway 19, from Courtenay to Campbell River.

Some road sections have accident rates per kilometer which are as high or higher than the above (e.g. Highway 1, from Victoria to Colwood Corners), while others have accidents per million vehicle kilometers travelled that are similarly higher (e.g. Highway 4, from Port Alberni to Doran Lake, and Highway 28 from

TABLE C-6

ACCIDENTS ON THE HIGHWAY NETWORK; 1979-1982

Highway	Link	Link Length (L) (kms)	SADT[1] 1980 (F) (vehicles/day)	No. of Accidents (N) (1979-82)	Accidents per km	Accident rate per million vehicle kms[2]
17	50-51	4.22	N/A	113 (1-way)	26.78 (1-way)	N/A
17	51-52	4.37	35,300	71	16.25	0.75
	52-51			56	12.81	
1	51-55	5.68	36,338	506	89.08	2.24
17	52-53	18.66	36,400	136	7.29	0.56
	53-52			279	14.95	
17	53-54	5.38	10,900	101	18.77	3.41[3]
	54-53			118	21.93	
1	55-56	10.39	18,000	451	43.41	2.20
1A	55-70	2.39	18,000	198	82.85	4.20[3]
1	56-57	23.06	14,300	239	10.36	0.66
1	57-58	17.84	15,000	207	11.60	0.71
1	58-59	28.22	10,000	531	18.82	1.72
18	58-73	25.80	4,300	42	1.63	0.35
18	59-60	8.58	13,000	184	21.45	1.51
1	60-61	16.93	15,000	657	38.81	2.36
19	61-62	34.70	16,000	1,302	37.52	2.14
19	62-63	10.85	13,000	315	29.03	2.04
4	62-76	46.75	7,000	670	14.33	1.87
19	63-64	61.10	6,800	997	16.32	2.19
19	64-65	49.04	9,300	1,510	30.79	3.02[3]
19	65-66	64.15	2,700	432	6.73	2.28
28	65-80	47.56	720	174	3.66	4.64
19	66-67	62.05	2,100	123	1.98	0.86
19	67-68	66.99	2,000	72	1.08	0.49
19	68-69	41.20	1,500	45	1.09	0.66
14	70-71	23.23	7,200	727	31.34	3.97[3]
14	71-72	71.42	1,800	238	3.33	1.69
18(prt)	73-74	129.77	-	62	4.03	-
4	76-78	43.31	1,500	329	7.60	4.62
4	78-79	47.74	1,500	158	3.31	2.01
18	80-81	42.39	720	112	2.64	3.35

Notes:

[1] Summer average daily traffic.

[2] Accident rate per million vehicle kms $(r_{mvk}) = \frac{N \times 1,000,000}{365 \times 3 \times F \times L}$

Since these rates were derived using the average daily traffic during summer months, the accident rates quoted are approximately 30% higher than if they were based on average traffic over the whole year.

[3] See Table C-7 and comments in text, Chapter C, section 3.3

Campbell River to Gold River). The four road sections listed above have the highest of both measures; i.e. 30 or more accidents per km and 3 or more accidents per million vehicle kilometers.

These sections have been examined in some detail to determine whether the accident problem may be related to the road section itself (e.g. geometrics, etc.), or to intersections along its length. The results are given in Table C-7, which indicates that on the critical sections of Highways 1A, 14 and 17 (southbound), intersections are not the main factor in traffic accidents; however, on the critical sections of Highways 19 and 17 (northbound), over 50 percent of the accidents occurred at or near intersections.

These results may be particularly significant for Highway 19 between Courtenay and Campbell River. It has over 30 intersections in an overall length of about 50 kilometers, an average spacing of only 1.5 kilometers. (Minor access points and driveways are not included in these figures). Thus, as traffic volumes increase on this section in future, the capacity of this alternating 2-lane/3-lane highway may be adversely affected by the frequency of intersections and accidents.

The results in Table C-7 may also be significant in the case of Highway 17, northbound. They imply that there are problems for northbound traffic at intersections on this stretch of road, and suggest that impatience on the part of drivers trying to meet ferries at Swartz Bay may be a contributing factor.

TABLE C-7

ANALYSIS OF CRITICAL HIGHWAY SECTIONS WITH HIGH ACCIDENT RATES; 1979-1982

Highway	Section	Number of Lanes	Speed Limit (kph)	No. of Inter-sections	Average Spacing (kms)	Accidents at Inter-sections	% of Total
17	Sidney-Swartz Bay	2x2	50-80	4	1.35	33 (s/bound) 60 (n/bound)	28.0 59.4
1A	Gorge-Goldstream	2-4	50	5	0.48	50	25.3
19	Courtenay-Campbell River	2-3	50-80	32	1.53	816	54.0
14	Colwood-Sooke	2-4	50-60	10	2.32	155	21.3

4.0 AUTOMOBILE TRAFFIC PROJECTIONS

4.1 Projection Procedures

Automobile traffic on Vancouver Island was analyzed under two headings: traffic by Island Residents and traffic by Off-Island Residents. Although they were treated separately, each involved the same analysis and projection procedures.

The basic procedures are described in detail in Appendix C-3 but may be summarized as follows:

- from roadside interviews and ferry survey data collected over the past few years, a table of daily vehicle trips between each of the 36 zones defined in this project was developed;
- the origin-destination trip information was then projected in line with the projected population of each zone and the projected ferry traffic on each route. This was done using "gravity" relationships which had the effect of increasing traffic in proportion to the population growth at each end of the trip;
- the projected trip information was then assigned, by computer, to the appropriate highway links connecting each pair of origin-destination zones. A minimum path algorithm was used for this assignment which had the effect of assigning all traffic to the route with the shortest journey time between two zones.

4.2 Projected Traffic on the Existing Road Network

The projection procedures summarized above provided an estimate of the origins and destinations of vehicle movements in the year 2001. Tables C-8 and C-9 show the resulting tabulations of summer average daily traffic for Island Resident and Off-Island Resident trips respectively. These tabulations exclude trips made by buses and trucks.

These future trip matrices were then assigned to the existing road network to produce the traffic loadings on each link as listed in Table C-10. These summer 2001, daily traffic estimates are also illustrated in Map 6. As was the case with the earlier Map 3 (which showed daily traffic in the summer of 1980), Map 6 tends to under-represent the large traffic volumes in the Victoria area.

Map 7 illustrates the increase in traffic which is projected for 2001 beyond that existing in 1980 (i.e. shows the difference between Map 6 and Map 3). As can be observed from Map 7, the majority of the increase in projected traffic is in the Victoria area. This additional traffic represents an increase of 30-60% over 1980 levels by the year 2001, depending on the particular highway link.

Elsewhere on Vancouver Island, increases in traffic are not projected to be as large as in the Victoria area in terms of numbers of vehicle trips, however, they still represent sizable percentage increases over current levels. For example, increases of more than 80% are projected for the stretches of road between Parksville and Port Hardy, Campbell River and Gold River, and on a possible new road link between Gold River and Woss (Node 67).

TABLE C-8

PROJECTED ORIGIN-DESTINATION TABLE -- ISLAND RESIDENTS
(SART 2001, ZONE TO ZONE MOVEMENTS)

----- DESTINATION ZONES -----

	1	2	3	4	5	6	7	8	9	10	11	12
1	222170	63134	5852	17935	1594	73	982	693	144	172	18	401
2	63137	55651	8370	9975	746	31	301	332	40	58	149	150
3	5857	8383	60077	1353	213	7	122	45	22	12	74	31
4	17927	9970	1331	66669	2188	90	413	215	15	27	128	144
5	1589	744	213	2182	554	10	96	115	25	13	12	83
6	72	31	7	97	10	61	6	9	4	2	2	10
7	897	299	121	411	96	6	1061	45	7	6	7	15
8	666	319	43	287	111	9	44	5173	911	5	188	1403
9	137	39	21	15	24	4	7	902	2348	21	328	1642
10	167	40	12	26	12	2	6	5	22	608	28	127
11	17	162	78	122	11	2	7	107	329	28	962	1467
12	381	142	38	136	79	9	11	1384	1435	124	1458	15914
13	287	79	47	43	12	2	8	149	77	26	54	2627
14	32	38	16	24	6	0	18	44	39	9	36	87
15	131	29	16	16	6	2	8	14	31	10	25	854
16	286	80	15	34	5	3	15	76	11	13	11	638
17	28	26	13	17	6	0	9	23	11	4	8	55
18	8	7	4	5	2	0	3	6	3	3	2	8
19	29	25	13	17	3	0	9	21	9	4	6	24
20	93	17	9	12	5	0	6	15	6	3	5	66
21	143	71	7	15	22	2	27	18	38	5	19	382
22	38	6	25	15	7	2	11	40	19	9	21	201
23	139	19	19	29	12	2	9	48	18	15	14	327
24	33	17	9	12	2	0	4	13	4	3	4	8
25	12	13	7	10	2	0	4	10	4	2	4	38
26	14	4	5	9	2	0	3	12	4	1	4	31
27	10	12	5	7	0	0	3	5	4	1	2	5
28	24	16	7	10	2	0	4	10	4	2	2	22
29	137	20	4	10	2	0	4	25	16	2	4	47
30	3	0	0	0	0	0	0	0	0	0	0	5
31	3	0	0	0	0	0	0	0	0	0	0	66
32	77	65	30	32	6	4	11	271	71	35	52	613
33	1184	980	349	347	69	5	132	380	14	7	9	54
34	72	4	9	10	2	0	4	12	2	2	2	28
35	129	7	16	18	4	0	7	24	4	3	4	36
36	0	0	2	2	0	0	2	2	0	0	0	2
TOTAL	315757	140448	64804	77641	5815	333	4080	10163	5084	1021	3580	27593

	13	14	15	16	17	18	19	20	21	22	23	24
1	218	33	138	217	29	9	29	94	152	32	148	24
2	83	31	21	85	27	8	26	18	76	6	28	18
3	49	16	16	15	14	5	14	9	7	24	28	10
4	45	25	17	34	18	5	10	13	16	16	31	12
5	13	6	6	5	6	2	3	5	24	8	12	2
6	2	0	2	3	0	0	0	0	2	2	2	0
7	8	19	8	16	9	3	9	6	28	11	18	4
8	156	44	14	75	23	6	21	15	19	41	49	14
9	77	39	31	11	11	3	9	6	40	19	18	4
10	24	9	18	12	4	3	4	3	5	9	15	3
11	54	35	25	11	8	2	6	5	19	21	14	4
12	2626	85	854	637	54	8	23	65	395	202	330	8
13	3140	14	184	912	31	3	17	41	153	82	78	11
14	15	69	8	14	2	0	2	0	11	6	8	0
15	184	8	1029	422	14	2	5	7	214	143	38	7
16	914	14	423	3435	135	9	101	44	71	33	45	7
17	31	2	14	136	89	3	5	3	24	13	15	0
18	3	0	2	9	3	26	1	0	3	2	3	0
19	17	2	5	102	5	1	162	10	22	11	15	2
20	42	0	7	45	3	0	10	141	22	5	8	0
21	152	11	212	78	23	3	22	22	4049	2132	1590	294
22	81	6	141	33	12	2	11	5	2132	631	164	30
23	77	8	37	45	15	3	15	8	1591	164	4113	381
24	11	0	7	7	0	0	2	0	295	30	382	74
25	9	0	7	12	0	0	2	0	38	20	554	4
26	8	0	20	5	0	0	0	0	77	13	241	10
27	4	0	2	8	0	0	0	0	6	7	33	4
28	7	0	4	12	0	0	0	3	44	16	122	2
29	28	0	11	18	2	0	2	8	126	26	334	11
30	0	0	0	0	0	0	0	0	7	5	5	0
31	11	0	6	25	0	0	0	0	74	39	24	2
32	117	4	170	447	51	7	51	42	273	140	348	39
33	22	2	14	35	4	2	4	4	15	8	19	3
34	3	2	3	18	2	2	2	2	5	2	5	2
35	5	2	5	28	2	2	2	4	10	5	18	2
36	0	0	0	2	0	0	0	0	2	0	0	0
TOTAL	8233	485	3458	7148	596	116	519	585	10046	3734	8837	989

	25	26	27	28	29	30	31	32	33	34	35	36	TOTAL
1	13	15	10	25	144	3	3	76	1162	60	137	0	315866
2	13	5	12	16	21	0	0	64	969	4	7	0	[illegible]
3	8	5	3	8	4	0	0	29	343	9	16	2	64828
4	10	9	7	10	10	0	0	31	360	10	18	2	77665
5	2	2	0	2	2	0	0	6	78	2	4	0	5825
6	0	0	0	0	0	0	0	4	5	0	0	0	332
7	4	4	4	4	4	0	0	11	129	4	7	2	4077
8	10	13	5	10	25	0	0	266	294	12	24	2	10133
9	4	4	4	4	16	0	0	70	14	2	4	0	5069
10	2	2	2	2	2	0	0	34	7	2	3	0	1019
11	4	4	2	2	4	0	0	51	9	2	4	0	3576
12	30	31	5	22	47	5	66	682	53	20	35	2	27501
13	9	0	4	7	28	0	11	115	22	3	5	0	8207
14	0	0	0	0	0	0	0	4	2	2	2	0	485
15	7	20	2	4	11	0	4	167	10	3	5	0	3445
16	12	5	8	12	18	0	25	439	34	10	20	2	7120
17	0	0	0	0	2	0	0	50	4	2	2	0	594
18	0	0	0	0	0	0	0	7	2	2	2	0	116
19	2	0	0	0	2	0	0	50	4	2	2	0	517
20	0	0	0	3	0	0	0	41	4	2	4	0	583
21	30	77	5	44	124	7	72	240	15	5	9	2	10005
22	20	13	7	14	26	5	30	144	8	2	5	0	3917
23	553	240	33	121	330	5	23	342	19	5	10	0	8801
24	4	10	4	2	10	0	2	39	3	2	2	0	985
25	47	4	2	0	10	5	2	27	3	2	2	0	863
26	4	144	5	4	6	0	0	29	3	0	0	0	676
27	2	5	125	2	4	0	0	13	2	2	2	0	276
28	0	4	2	372	4	11	0	22	3	0	0	0	739
29	11	4	4	4	507	14	0	44	0	2	2	0	1439
30	5	0	0	11	14	0	0	0	0	0	0	0	56
31	2	0	0	0	0	0	0	0	0	0	0	0	231
32	27	30	13	23	66	0	0	0	0	0	0	0	3106
33	3	3	2	3	8	0	0	0	0	0	0	0	3428
34	2	0	2	0	2	0	0	0	0	0	0	0	185
35	2	0	2	0	2	0	0	0	0	0	0	0	330
36	0	0	0	0	0	0	0	0	0	0	0	0	22
TOTAL	845	678	276	741	1463	55	227	3851	3571	179	324	22	0

1 Victoria/Esquimalt/Oak Bay
2 Saanich
3 C & N Saanich/Sidney/Saltspring & Outer Gulf Is.
4 Colwood/Langford/Metchosin/View Royal
5 Sooke
6 Port Renfrew
7 Shawnigan
8 Duncan/N. Cowichan/Chemainus
9 Ladysmith
10 Lake Cowichan/Youbou
11 Cassidy/Gabriola
12 Nanaimo
13 Parksville
14 Nanaimo (rural)
15 Qualicum Beach
16 Port Alberni
17 Nitinat
18 Bamfield
19 Effingham
20 Tofino/Ucluelet
21 Courtenay/Comox
22 Cumberland
23 Campbell River
24 Strathcona (rural)
25 Sayward
26 Gold River
27 Tahsis/Zeballos
28 Port McNeill
29 Port Hardy/Port Alice
30 Port Hardy to Northern B.C. Ferry
31 Courtenay to Powell River Ferry
32 Nanaimo to Horseshoe Bay Ferry
33 Schwartz Bay to Tsawwassen Ferry
34 Sidney to Anacortes Ferry
35 Victoria to Port Angeles Ferry
36 Victoria to Seattle Ferry

TABLE C-9

PROJECTED ORIGIN-DESTINATION TABLE -- OFF-ISLAND RESIDENTS
(SADT 2001, ZONE TO ZONE MOVEMENTS)

----- DESTINATION ZONES -----

----- ORIGIN ZONES -----

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	TOTAL
1	26318	7470	442	2006	177	0	85	114	33	5	5	204	49	3	58	20	1	2	5	29	35	16	56	3	3	4	3	4	10	2	2	35	475	69	129	9	30330
2	7470	6525	940	1109	80	6	16	23	19	11	11	59	6	1	12	12	1	1	2	5	10	10	3	3	3	1	1	3	4	0	0	30	420	4	7	1	14822
3	442	940	3100	144	20	0	30	44	14	11	4	67	7	0	13	10	0	0	3	4	6	0	10	2	2	2	2	2	3	0	0	12	130	8	15	2	7397
4	2006	1109	144	4674	228	10	33	6	6	6	11	27	21	2	7	11	0	0	3	4	11	0	10	2	2	2	2	2	3	0	0	14	141	9	17	2	8533
5	177	80	20	228	68	0	11	4	6	3	3	13	7	0	7	4	0	0	0	1	19	3	3	0	0	0	0	0	2	0	0	3	32	2	4	2	786
6	0	6	0	10	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	29
7	85	16	30	33	11	0	152	46	17	10	9	13	12	0	0	0	0	0	1	3	6	6	7	2	2	2	0	2	2	0	0	6	53	3	7	2	541
8	114	23	44	4	6	0	46	334	16	23	5	11	24	2	17	4	1	1	3	10	14	11	13	3	2	2	2	2	3	0	0	110	114	11	41	2	1060
9	33	19	14	6	6	0	17	16	192	0	32	51	19	2	17	11	0	0	1	4	0	0	3	2	2	2	0	2	2	0	0	29	6	2	4	2	519
10	5	11	11	6	3	0	10	23	0	29	4	11	4	0	4	4	0	0	0	1	4	3	3	0	0	0	0	0	1	0	0	15	3	2	3	0	168
11	5	11	4	11	3	0	9	5	32	4	59	13	14	2	9	7	0	0	1	1	6	5	5	2	0	0	0	0	2	0	0	21	4	2	4	0	243
12	203	59	67	27	13	0	13	11	51	11	13	653	91	3	17	29	1	1	6	21	16	16	50	5	3	3	2	3	5	3	19	209	20	19	33	2	1739
13	69	6	7	21	7	0	12	24	19	4	14	91	500	2	82	15	3	2	6	21	7	24	9	5	4	5	3	4	9	0	3	44	10	2	4	2	1041
14	3	1	0	2	0	0	0	2	2	0	2	3	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	2	2	0	23
15	50	12	13	7	7	0	0	17	17	4	9	17	82	0	224	21	2	0	5	32	16	42	9	4	4	2	2	2	4	0	4	60	5	2	3	2	694
16	20	12	10	11	4	0	0	4	11	4	7	29	15	0	21	256	4	1	9	1	17	4	10	3	3	1	1	1	3	0	10	109	14	9	19	2	724
17	1	1	0	0	0	0	0	1	0	0	0	1	3	0	2	4	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	21	2	2	2	0	44
18	2	1	0	0	0	0	0	1	0	0	0	1	2	0	0	1	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	2	2	0	20
19	5	2	3	3	0	0	1	3	1	0	1	6	6	0	5	9	0	0	12	5	3	3	3	0	0	0	0	0	0	0	0	21	2	2	2	0	97
20	20	5	4	4	1	0	3	10	4	1	1	20	21	0	32	4	0	0	5	60	14	4	10	1	0	0	0	0	1	0	0	17	2	2	4	0	259
21	35	10	4	11	19	0	4	14	0	4	4	14	7	0	16	17	1	0	3	14	355	32	80	42	7	5	3	5	7	3	30	113	7	4	9	2	934
22	16	10	0	0	3	0	6	11	0	3	5	16	20	0	42	4	0	0	3	4	52	113	12	7	5	3	2	3	5	3	15	61	2	2	4	2	443
23	56	3	10	10	3	0	7	13	3	3	5	50	9	0	9	10	1	0	3	18	80	12	477	10	12	23	5	7	17	2	9	130	7	7	11	2	1054
24	3	3	2	2	0	0	2	3	2	0	2	5	5	0	4	3	0	0	0	1	42	7	18	21	2	3	2	2	2	0	2	16	2	2	2	0	157
25	3	3	2	2	0	0	2	2	2	0	0	3	4	0	4	3	0	0	0	0	7	5	12	2	14	2	0	2	3	2	0	10	0	2	2	0	90
26	4	1	2	2	0	0	2	2	2	0	0	3	5	0	2	1	0	0	0	0	5	3	23	3	2	23	2	2	2	0	0	13	0	0	0	0	100
27	3	1	2	2	0	0	0	2	0	0	0	2	2	0	2	1	0	0	0	0	3	2	5	2	0	2	14	0	2	0	0	6	0	2	2	0	53
28	4	3	2	2	0	0	2	3	2	0	0	3	4	0	2	1	0	0	0	0	5	3	7	2	2	2	0	43	12	6	0	10	3	0	0	0	119
29	10	4	3	3	2	0	2	3	2	1	2	5	9	0	4	3	0	0	0	1	7	5	17	2	3	2	2	12	85	7	0	18	2	2	2	0	229
30	2	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	4	4	2	0	2	0	0	6	7	0	0	0	0	0	0	0	29
31	2	0	0	0	0	0	0	0	0	0	0	20	4	0	4	11	0	0	0	0	32	16	9	2	0	0	0	0	0	0	0	0	0	0	0	0	99
32	36	31	13	14	3	2	4	115	30	15	22	261	60	3	71	197	22	3	22	18	119	64	144	16	11	13	6	18	19	0	0	0	0	0	0	0	1336
33	308	413	144	147	33	2	35	119	7	4	4	21	10	0	5	15	2	0	2	2	7	2	7	2	0	0	0	3	3	0	0	0	0	0	0	0	1541
34	72	5	9	10	2	0	4	12	2	2	2	19	2	2	2	10	2	2	2	2	5	2	7	2	2	0	2	0	2	0	0	0	0	0	0	0	104
35	135	0	16	17	4	0	7	42	4	3	4	34	5	2	5	20	2	2	2	4	9	5	12	2	2	0	2	0	2	0	0	0	0	0	0	0	350
36	9	1	2	2	2	0	2	2	2	0	0	2	2	0	2	2	0	0	0	0	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	36
TOTAL	30372	14811	7405	8542	780	29	544	1873	521	169	244	1755	1041	23	698	734	45	20	98	260	942	467	1043	150	91	100	53	120	231	28	94	1277	1491	175	325	34	0

1 Victoria/Esquimalt/Oak Bay
2 Saanich
3 C & N Saanich/Sidney/Saltspring & Outer Gulf Is.
4 Colwood/Langford/Metchosin/View Royal
5 Sooke
6 Port Renfrew
7 Shawnigan
8 Duncan/N. Cowichan/Chemainus
9 Ladysmith
10 Lake Cowichan/Youbou
11 Cassidy/Gabriola
12 Nanaimo
13 Parksville
14 Nanaimo (rural)
15 Qualicum Beach
16 Port Alberni
17 Nitinat
18 Bamfield
19 Effingham
20 Tofino/Ucluelet
21 Courtenay/Comox
22 Cumberland
23 Campbell River
24 Strathcona (rural)
25 Sayward
26 Gold River
27 Tahsis/Zeballos
28 Port McNeil
29 Port Hardy/Port Alice
30 Port Hardy to Northern B.C. Ferry
31 Courtenay to Powell River Ferry
32 Nanaimo to Horseshoe Bay Ferry
33 Swartz Bay to Tsawwassen Ferry
34 Sidney to Anacortes Ferry
35 Victoria to Port Angeles Ferry
36 Victoria to Seattle Ferry

TABLE C-10

PROJECTED TRAFFIC IN 2001 ON MAJOR HIGHWAY LINKS
WITH A COMPARISON TO 1980 TRAFFIC
(Summer Average Daily Traffic)

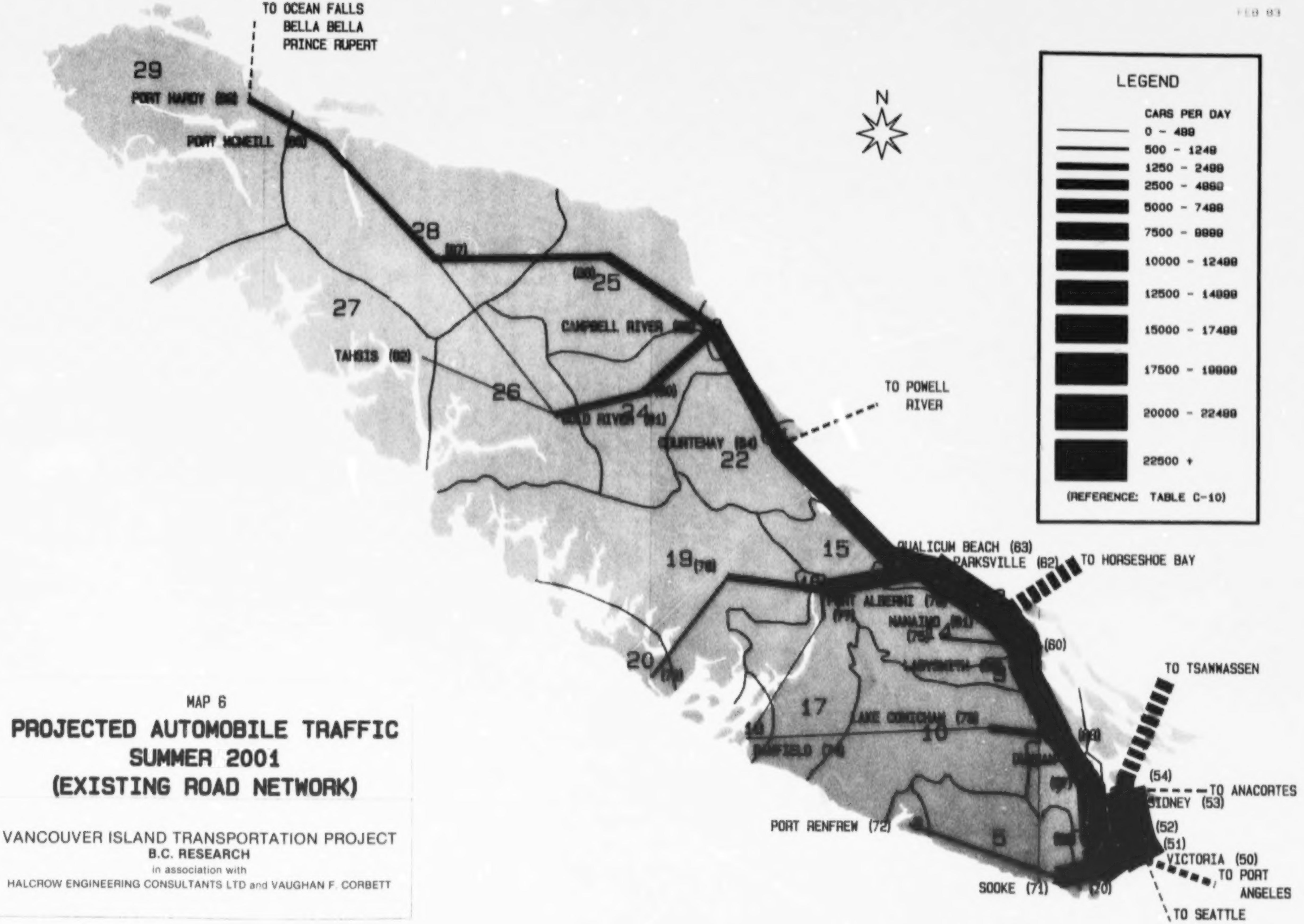
Highway Link	Island Residents	Off-Island Residents	Total	Increase over 1980	
				Number	%
50-51 Victoria-Junction 17 & 1	187,436	23,870	211,306	43,578	26
51-52 Junction 17 & 1-Hwy 17 (Sannich)	171,807	22,354	194,161	40,122	26
51-55 1 & 1A Corridor from Hwy 17 to 14	78,209	11,284	89,493	30,134	51
52-53 Hwy 17 (Sannich)-Sidney	39,623	7,252	46,875	15,670	50
53-54 Sidney-Swartz Bay	7,202	3,050	10,252	4,143	68
55-56 Junction 1 & 14-Goldstream	14,406	3,940	18,346	6,396	54
55-70 Junction 1 & 14-Colwood	65,771	7,716	73,487	24,782	51
56-57 Goldstream-Malahat	16,911	4,326	21,237	7,685	57
56-71* Goldstream-Sooke	-	-	-	-	-
57-58 Malahat-Junction 1 & 18	13,430	4,151	17,581	6,381	57
57-72* Malahat-Port Renfrew	-	-	-	-	-
58-59 Junction 1 & 18-Ladysmith	16,302	3,802	20,104	7,796	63
58-73 Junction 1 & 18-Lake Cowichan	1,319	295	1,614	464	40
59-60 Ladysmith-Cassidy	18,548	3,926	22,474	8,976	67
60-61 Cassidy-Nanaimo	20,038	3,895	23,933	9,733	69
60-75 Cassidy-Nanaimo (rural)	834	48	882	386	78
61-62 Nanaimo-Parksville	21,902	4,348	26,250	11,470	78
62-63 Parksville-Qualicum Beach	12,890	3,223	16,113	7,259	82
62-76 Parksville-Port Alberni	8,558	1,527	10,085	3,605	56
63-83 Qualicum Beach-Hwy 19 (near Bowser)} 83-64 Hwy 19 (near Bowser)-Courtenay	9,844	2,628	12,472	5,562	80
64-65 Courtenay-Campbell River	9,771	1,806	11,577	5,431	88
64-76* Courtenay-Port Alberni	-	-	-	-	-
65-66 Campbell River-Hwy 19 (Sayward)	4,108	523	4,631	2,245	94
65-80 Campbell River-Hwy 28 (Strathcona)	3,091	486	3,577	1,701	91
66-67 Hwy 19 (Sayward)-Woss	2,566	392	2,958	1,392	89
67-68 Woss-Port McNeill	2,598	404	3,002	1,414	89
67-81 Woss-Gold River	32	12	44	22	100
68-69 Port McNeill-Port Hardy	1,922	318	2,240	1,044	87
70-71 Colwood-Sooke	11,038	1,329	12,367	4,994	68
71-72 Sooke-Port Renfrew	545	56	601	251	72
72-73* Port Renfrew-Lake Cowichan					
73-74 Lake Cowichan-Bamfield	101	16	117	37	46
74-77 Bamfield-Nitinat	82	14	96	30	45
76-77 Port Alberni-Nitinat	1,083	99	1,182	370	46
76-78 Port Alberni-Hwy 4 (Effingham)	1,674	552	2,226	680	44
76-83* Port Alberni-Dunsmuir	-	-	-	-	-
78-79 Hwy 4 (Effingham)-Hwy 4 Tofino/Ucluelet	885	399	1,284	386	43
80-81 Hwy 28 (Strathcona)-Gold River	1,322	228	1,550	698	82
81-82 Gold River-Tahsis	301	86	387	165	74
69-30 Port Hardy-Prince Rupert Ferry	110	58	168	68	68
64-31 Courtenay-Powell River Ferry	460	194	654	266	69
61-32 Nanaimo-Horseshoe Bay Ferry	6,152	2,613	8,765	3,539	68
54-33 Swartz Bay-Tsawwassen Ferry	7,202	3,050	10,252	4,143	68
53-34 Sidney-Anacortes Ferry	366	360	726	294	68
50-35 Victoria-Port Angeles Ferry	650	686	1,336	536	67
50-36 Victoria-SEattle Ferry	44	72	116	48	71

* Possible future highway links.

In terms of the number of additional car trips on the road during the summer, the largest increases are expected on the following routes:

- Victoria Area
  - Victoria - Junction 17 & 1 (nodes 50-51): an increase of 43,000 car trips/day (26%) in the summer;
- Highway 17
  - Junction 17 & 1 - Hwy. 17 Saanich (nodes 51-52): an increase of 40,000 cars/day (26%);
  - Hwy. 17 Saanich - Sidney (nodes 52-53): an increase of 15,000 cars/day (50%);
- Highway 14
  - Junction 1 & 14 - Collwood (nodes 55-70): an increase of 24,000 cars/day (51%);
- Highway 1
  - 1 & 1A Corridor from Hwy. 17 to 14 (nodes 51-55): an increase of 30,000 cars/day (51%) in the summer traffic on Highways 1 and 1A combined;
  - Ladysmith - Cassidy (nodes 59-60): an increase of 9,000 cars/day (67%);
  - Cassidy - Nanaimo (nodes 60-61): an increase of 9,000 cars/day (69%);
- Highway 19
  - Nanaimo - Parksville (nodes 61-62): an increase of 11,000 cars/day (78%).

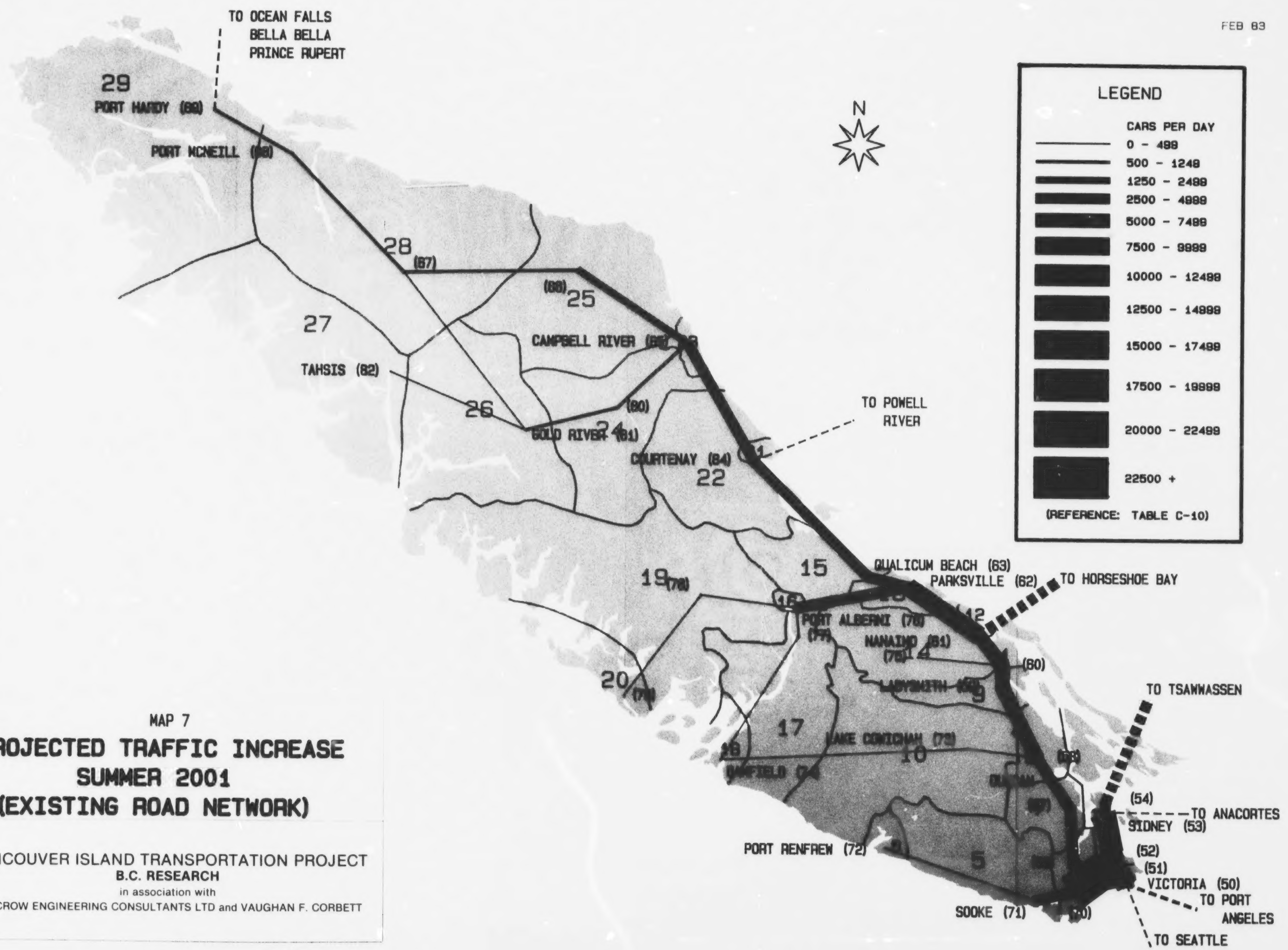
FEB 83


TO OCEAN FALLS
BELLA BELLA
PRINCE RUPERT
29
PORT HARDY (88)
PORT MCNEILL (88)
28
(87)
25
27
CAMPBELL RIVER
TAHSIS (82)
26
24
GOLD RIVER (81)
COURTENAY (84)
22
TO POWELL RIVER
N
15
19
QUALICUM BEACH (63)
PARKSVILLE (62)
TO HORSESHOE BAY
PORT ALBERNI
NANAIMO (61)
(60)
LADYSMITH
20
17
LAKE COWICHAN
16
BAMFIELD
DUNCAN
TO TSAWWASSEN
(54)
TO ANACORTES
SIDNEY (53)
(52)
(51)
VICTORIA (50)
TO PORT ANGELES
TO SEATTLE
PORT RENFREW (72)
5
SOOKE (71)
(70)
LEGEND
CARS PER DAY
0 - 499
500 - 1249
1250 - 2499
2500 - 4999
5000 - 7499
7500 - 9999
10000 - 12499
12500 - 14999
15000 - 17499
17500 - 19999
20000 - 22499
22500 +
(REFERENCE: TABLE C-10)

MAP 6

PROJECTED AUTOMOBILE TRAFFIC
SUMMER 2001
(EXISTING ROAD NETWORK)

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT


FEB 83
TO OCEAN FALLS
BELLA BELLA
PRINCE RUPERT
29
PORT HARDY (69)
PORT MCNEILL (68)
28
(67)
(66)
25
27
CAMPBELL RIVER (65)
TAHSIS (82)
26
(80)
24
GOLD RIVER (81)
COURTENAY (84)
22
TO POWELL
RIVER
N
LEGEND
CARS PER DAY
0 - 499
500 - 1249
1250 - 2499
2500 - 4999
5000 - 7499
7500 - 9999
10000 - 12499
12500 - 14999
15000 - 17499
17500 - 19999
20000 - 22499
22500 +
(REFERENCE: TABLE C-10)
15
19
(78)
16
QUALICUM BEACH (63)
PARKSVILLE (62)
TO HORSESHOE BAY
12
PORT ALBERNI (76)
(77)
NANAIMO (61)
(75)
14
(60)
20
(79)
LADYSMITH (59)
9
TO TSAWWASSEN
17
LAKE COWICHAN (73)
10
18
BAMFIELD (74)
DUNCAN
(58)
(57)
(54)
TO ANACORTES
SIDNEY (53)
(52)
(51)
VICTORIA (50)
TO PORT
ANGELES
TO SEATTLE
PORT RENFREW (72)
5
SOOKE (71)
(70)

MAP 7

PROJECTED TRAFFIC INCREASE
SUMMER 2001
(EXISTING ROAD NETWORK)

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

4.3 Projected Traffic on a Possible Future Road Network

The forecast 2001 origin-destination trip matrices were also loaded onto a possible future road network. The present network was modified to include five possible future road links as follows:

* Sooke - Goldstream (71-56): this route, if developed, would be an entirely new road through Sooke Mountain Park, connecting Sooke to Highway 1 at Goldstream;

* Port Renfrew - Malahat (72-57): this route, if developed, might follow existing logging roads from Port Renfrew to Shawnigan Lake and then connect with Highway 1 near Malahat;

* Port Renfrew - Lake Cowichan (72-73): this route, if developed, might follow existing logging roads north from Port Renfrew to Honeymoon Bay and then to Lake Cowichan;

* Port Alberni - Dunsmuir (76-83): this route, if developed, would circle around Horne Lake, linking Port Alberni to Highway 19 at approximately Dunsmuir. It would therefore allow northbound traffic from Port Alberni to by-pass the Parksville-Qualicum Beach section of Highway 19;

* Port Alberni - Courtenay (76-64): this route, if developed, might follow the general route of existing logging roads northwest from Port Alberni; circle around Comox Lake, and then pass through Cumberland to Courtenay.

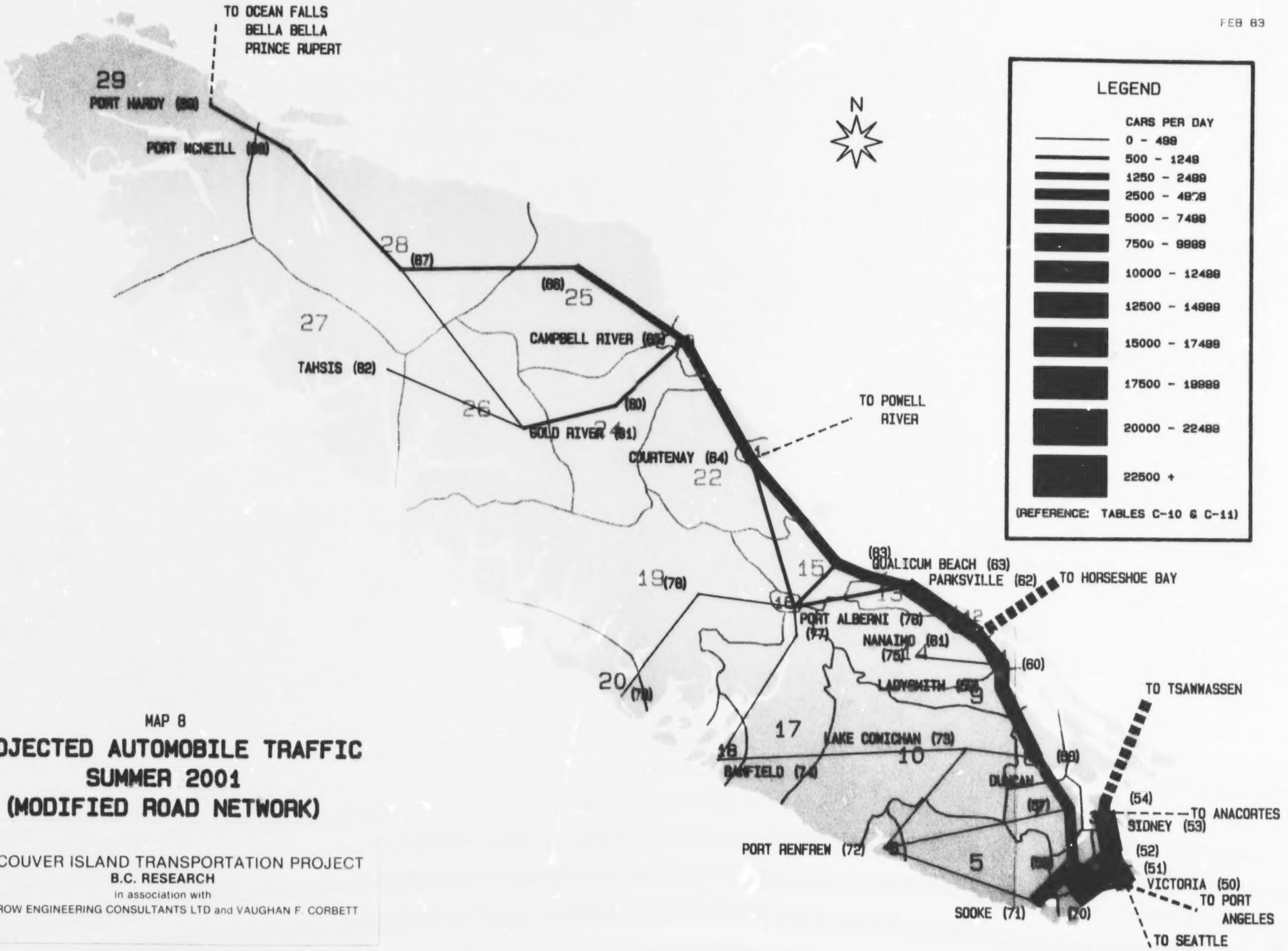
Table C-11 provides the results of the traffic assignments using the possible future road network rather than the existing network. Only those links which had traffic volumes affected by the modified network are listed in Table C-11. Map 8

TABLE C-11

PROJECTED TRAFFIC IN 2001 ON SELECTED HIGHWAY LINKS IN THE EXISTING AND POSSIBLE FUTURE ROAD NETWORK

			Difference	
Highway Link	Existing Road Network	Possible Future Road Network	Number	%
55-56 Junction 1 & 14-Goldstream	18,300	17,200	-1,170	-6.4
55-70 Junction 1 & 14-Colwood	73,500	72,300	-1,170	-1.6
56-57 Goldstream-Malahat	21,200	21,100	-103	-0.5
56-71* Goldstream-Sooke	-	6,100	+6,108	N/A
57-58 Malahat-Junction 1 & 18	17,600	17,600	-4	-0.0
57-72* Malahat-Port Renfrew	-	100	+99	N/A
58-73 Junction 1 & 18-Lake Cowichan	1,600	1,600	-4	-0.3
62-63 Parksville-Qualicum Beach	16,100	14,100	-2,035	-12.6
62-76 Parksville-Port Alberni	10,100	8,100	-2,035	-20.2
63-83 Qualicum Beach-Hwy. 19 (near Bowser)	12,500	12,500	+7	+0.1
83-64 Hwy. 19 (near Bowser)-Courtenay	12,500	11,500	-1,014	-8.1
64-76* Courtenay-Port Alberni	-	1,000	+1,014	N/A
70-71 Colwood-Sooke	12,400	6,200	-6,211	-50.2
71-72 Sooke-Port Renfrew	600	500	-103	-17.1
72-73* Port Renfrew-Lake Cowichan	-	4	+4	N/A
76-83* Port Alberni-Dunsmuir	-	1,000	+1,021	N/A

* Possible future highway links.



FEB 83
TO OCEAN FALLS
BELLA BELLA
PRINCE RUPERT
29
PORT HARDY (89)
PORT MCNEILL (88)
28
(87)
(86)
25
27
CAMPBELL RIVER (85)
TAHSIS (82)
26
(80)
GOLD RIVER (81)
24
COURTENAY (64)
22
TO POWELL
RIVER
N
LEGEND
CARS PER DAY
0 - 499
500 - 1249
1250 - 2499
2500 - 4999
5000 - 7499
7500 - 9999
10000 - 12499
12500 - 14999
15000 - 17499
17500 - 19999
20000 - 22499
22500 +
(REFERENCE: TABLES C-10 & C-11)
(83)
QUALICUM BEACH (63)
PARKSVILLE (62)
TO HORSESHOE BAY
15
19 (78)
13
12
PORT ALBERNI (76)
(77)
NANAIMO (61)
(75)
14
(60)
20
(79)
LADYSMITH (59)
9
TO TSAWWASSEN
17
LAKE COWICHAN (73)
18
10
BAMFIELD (74)
(58)
DUNCAN
(57)
(54)
TO ANACORTES
SIDNEY (53)
PORT RENFREW (72)
5
(52)
(51)
VICTORIA (50)
TO PORT
ANGELES
SOOKE (71)
(70)
TO SEATTLE

MAP 8

PROJECTED AUTOMOBILE TRAFFIC
SUMMER 2001
(MODIFIED ROAD NETWORK)

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

illustrates the increase in daily summer traffic which is forecast from 1980 to 2001 for all links in the modified road network.

From Table C-11, and by comparing Maps 7 and 8, it can be seen that the modified road network would substantially reduce traffic loads on some links: 70-71 Colwood - Sooke (by 50%); 62-76 Parksville - Port Alberni (by 20%); 62-63 Parksville - Qualicum Beach (by 13%). The three possible new road links of 71-56 Sooke - Goldstream, 76-83 Port Alberni - Dunsmuir, and 76-64 Port Alberni - Courtenay are the cause of these reductions. The two possible road links of 72-57 Port Renfrew - Malahat and 72-73 Port Renfrew - Lake Cowichan would not attract significant traffic volumes.

It should be noted, however, that the technique used in this study is a simplistic means of simulating future traffic. No account has been taken, for instance, of the re-distribution of travel patterns brought about by the new sections of highway (i.e. drivers changing their trip destinations because of better access, etc.), nor of new trips being generated because of the new roads. In addition, the assignment of traffic on the basis of minimum travel time will tend to over-estimate volumes on new, faster routes, while travel times on existing routes experiencing congestion should also be adjusted to compensate. The results given in Table C-11 and Maps 7 and 8 should, therefore, be used only as a broad guide to the likely effects of population increases and road network expansion, as foreseen at this time.

4.4 Locations With Potential Congestion Problems

The projected increase in activity on the highway system by 2001 has implications regarding congestion and safety for the network existing in 1980 or for the network as modified with the five possible future links. In particular, if it is assumed that peak hour traffic in 2001 constitutes approximately 10-12% of the projected summer average daily traffic (as it did in 1980), this suggests that the following sections of highway will experience congestion, unstable traffic conditions and low levels of service during peak periods:

* Highway 14

Goldstream to Sooke (55-70 and 70-71);

* Highway 1

1 & 1A Corridor from Hwy. 17 to 14 (51-55) is likely to be congested depending on the traffic split between 1 and 1A;

Goldstream to Duncan (55-56 and 56-57), on two-lane sections;

Junction 1 & 18 (near Chemainus) to Nanaimo (58-59, 59-60 and 60-61), on 2 and 3-lane sections;

* Highway 19

Nanaimo to Qualicum Beach (61-62 and 62-63) on 2-lane sections;

Courtenay to Campbell River (64-65);

* Highway 17

Victoria to Junction 1 & 17.

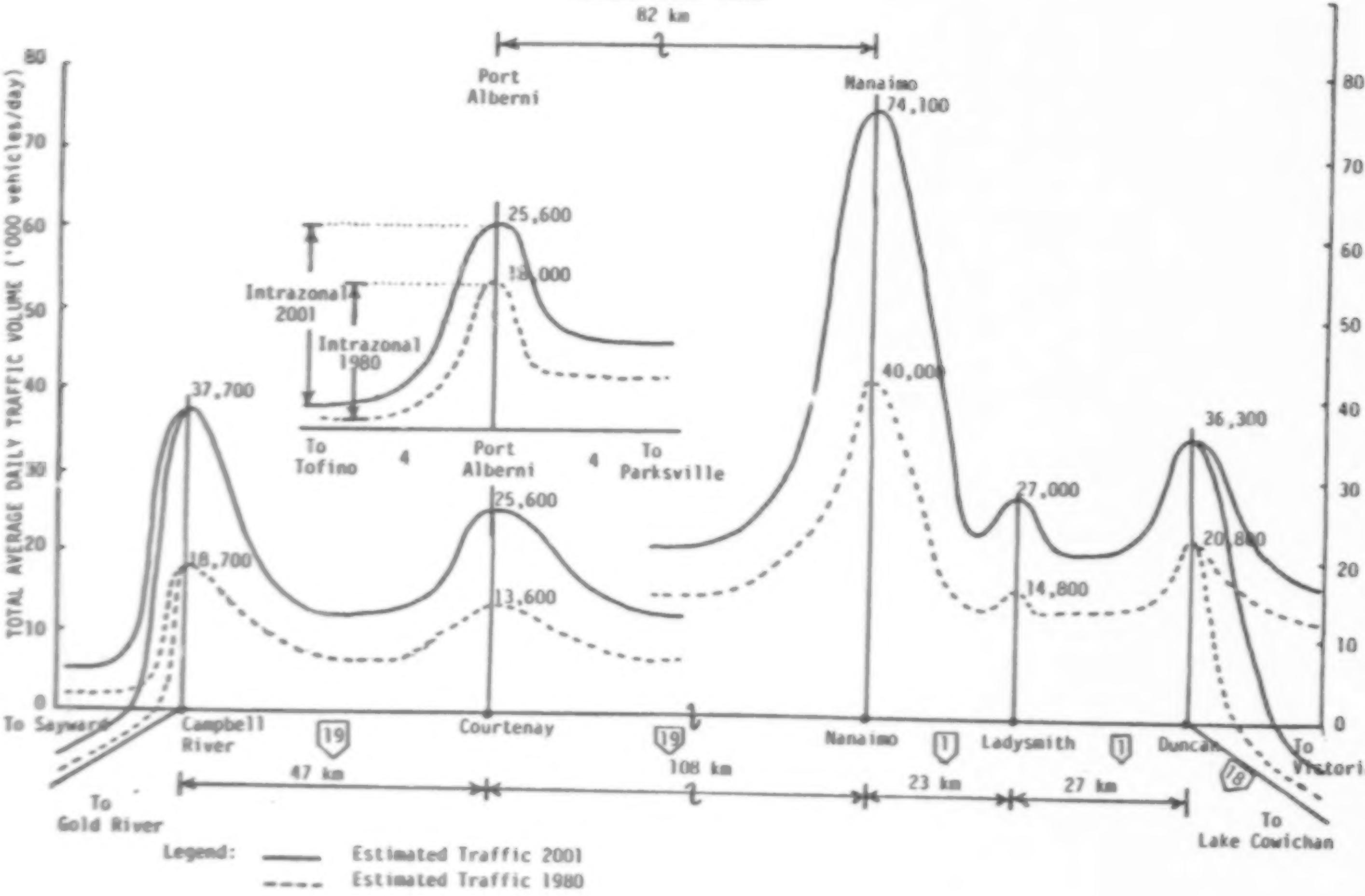
On highway sections passing through major towns, there will also be increased activity by the year 2001. The likely future levels of traffic along these sections (excluding Victoria) have been estimated and are illustrated in Figure C-3 for the towns of Duncan, Ladysmith, Nanaimo, Courtenay, Campbell River, and Port Alberni. For comparison purposes, the 1980 summer average daily traffic volumes in these communities are also shown.

Future traffic volumes within these six communities have been projected simply in proportion to the projected increase in population within each community. Because the inter-urban traffic volumes on adjacent links are projected to grow at different rates, the profile of inter-urban versus intra-zonal traffic changes between 1980 and 2001.

The highest percentage increase (100%) in traffic within towns is forecast to occur in Campbell River. The Ministry of Transportation and Highways is already examining ways of accommodating this increased activity (possibly by providing an additional east-west crossing of the river with related access routes).

Other towns studied are expected to experience increases in traffic from 40% in Port Alberni, to 75% in Duncan, and 80-90% in Courtenay, Nanaimo, and Ladysmith. Nanaimo is forecast to experience the highest numerical increase in traffic flows at the centre of the city, from about 40,000 vehicle trips per day during summer 1980 to approximately 74,000 trips by 2001.

FIGURE C-3
AVERAGE DAILY TRAFFIC VOLUMES ON HIGHWAY SECTIONS
THROUGH MAJOR TOWNS



5.0 SUMMARY

The existing road network on Vancouver Island consists of more than 1,000 kilometers of paved highway, together with arterial, collector and access roads within individual communities, and an extensive system of unpaved, all-weather gravel roads to serve rural areas, remote communities, and the logging industry. The main highways stretch from the north end of the Island to its southern tip and generally follow the eastern coastline. Although predominantly of a 2-lane standard, there are short stretches of 3, 4 and 6 lanes near major communities and in the more congested areas.

Vehicle traffic on the highway network on Vancouver Island, and on the main ferry routes to and from the Island, has shown a steady increase during the 1977 to 1981 period. Traffic is heaviest at the southern end of the Island, in the Greater Victoria area. Here, the summer average daily traffic during 1980 ranged from 30,000 to over 60,000 vehicles per day, depending on the particular highway link in question. Along the main Island Highway, from Victoria northward to Campbell River, traffic levels are typically in the 6,000 to 18,000 vehicles per day range. Elsewhere on the Island, traffic levels generally range from 1,000 to 2,000 vehicles per day.

For the purposes of this study, origin-destination data from 10 roadside interview surveys were combined into two overall matrices of automobile trips on Vancouver Island in 1980. These matrices represent trips by "Island Residents" and "Off-Island Residents" to and from each of the 29 Island zones and 7 off-Island zones used in the study. The origin-destination trip information was then projected in line with the projected population of each zone and the projected ferry traffic on each ferry route. This was done using "gravity" relationships which had the effect of increasing traffic in proportion to the population growth at each end of the trip.

The projected trip information was then assigned, by computer, to the appropriate highway links connecting each pair of origin-destination zones. This provided an estimate of the traffic loadings on each link during the summer of 2001.

The majority of the increase in projected traffic is in the Victoria area, representing an increase of 30 to 60% over 1980 levels by the year 2001 depending on the particular highway link. Elsewhere on Vancouver Island, while traffic increases are not projected to be as large in terms of number of vehicles per day, they still represent sizeable percentage increases over current levels. Increases of more than 80% are projected for the stretches of road between Parksville and Port Hardy, Campbell River and Gold River, and between Gold River and Woss.

This projected increase in activity on the highway system by the year 2001 will likely pose congestion and safety problems in a number of locations.

D. FERRIES

D. FERRIES

1.0 FERRY SERVICES

A comprehensive system of ferry services operates around Vancouver Island as a natural extension and supplement to the public road network. These services are illustrated in Map 9 and include operations by the Ministry of Transportation and Highways, the B.C. Ferry Corporation, private enterprises with government subsidy, and private enterprises without subsidy. They link Vancouver Island with the Lower Mainland, Northern British Columbia, the Sunshine Coast and the United States. They also link the Gulf Islands to the Lower Mainland and to Vancouver Island. Local coastal ferry services are in operation between various points on Vancouver Island and the many smaller islands in the Strait of Georgia and Johnstone Strait. Coastal freighter services operate along both coasts of Vancouver Island, providing services to many of the small communities and Indian Villages in this region. In its entirety, this extensive system of ferry services provides essential access to Vancouver Island in lieu of roads.

Table D-1 groups these ferry services into four main categories: Mainland Services (connecting Vancouver Island to the B.C. Mainland); International Services (providing direct links between Vancouver Island the United States); Coastal Ferries (connecting the smaller islands with Vancouver Island); and Coastal Freighters (along the east and west coasts of Vancouver Island). For each ferry route, Table D-1 shows the distances and crossing times (which may vary in some cases depending upon stops made en route), number of round trips made per day in 1980 (with seasonal variations indicated), capacity of vessels which were operating on these routes in 1980 (in terms of equivalent automobile units and passengers), and an indication of the overhead clearance available for vehicles.

TABLE D-1

MAIN FERRY ROUTES

Route Name	Distance (km)	Crossing Time (mins)	Number of Round Trips per Day (1980)		Vessel Capacity (1980)		Overhead Clearances (meters)
			Winter	Summer	Cars[5]	Passengers	
a) Mainland Services							
Swartz Bay-Tsawwassen[1]	39	100	13[2]	20[3]	286/350	1200	4.51/4.79
Nanaimo (Departure Bay)-Horseshoe Bay	48	110	10[2]	13[3]	192/362	987/1466	4.51/4.88
Port Hardy-Prince Rupert	441	18/21 hrs	2 per week	3/4 per week	157/80	750/458	3.96/4.45
Port Hardy-Tsawwassen	378	12 hrs	1 per week	None[6]	157/80	750/458	3.96/4.45
Comox (Little River)-Powell River	27	90	4	5	83[4]	475[4]	4.89[4]
b) International Services							
Sidney-San Juan Is (USA)	35	90	1	3	100/260	1200/3700	N/A
San Juan-Anacortes (USA)	36	1.5-2 hrs					
Victoria-Seattle (USA)	110	4.25 hrs	None[7]	1	50	1800	N/A
Victoria-Port Angeles (USA)	35	90	2	3	100	800	4.26

Notes:

[1] M.V. 'Queen of Alberni' overheight vehicle ferry also operates 3 to 4 round trips per day. No buses are carried on these sailings; foot passenger capacity is limited; sailing time 80 mins. Car capacity 145; passenger capacity 450, overhead clearance 4.75 m.

[2] Increased service in Fall.

[3] Reduced service in Spring.

[4] Vessel capacity increased in 1982 to 138 cars, 700 passengers; clearance 4.51 m.

[5] Equivalent Automobile Units.

[6] No summer service available between these points.

[7] No winter service available between these points.

N/A Not available.

Source: B.C. Ferries, Ministry of Transportation and Highways,
Washington State Ferries, Blackball Transportation Inc.

TABLE D-1

(Continued)

Route Name	Distance (kms)	Crossing Time (mins)	Number of Round Trips per Day (1980)		Vessel Capacity (1980)		Overhead Clearances (meters)
			Winter	Summer	Cars[5]	Passengers	
c) Coastal Ferries							
Brentwood Bay-Mill Bay	5	15	9	9	17	168	N/A
Swartz Bay-Saltspring Island	8.0	30	10	10[1]	70	340	4.57
Swartz Bay-Outer Gulf Islands	varies	1-4 hrs (round-trip)	5[1]	5	70	340	4.57
Crofton-Saltspring Island	4.5	20	11[1]	11[1]	35	177	4.27
Chemainus-Thetis/Kuper Is.	6.0	35	10	10	26	150	N/A
Nanaimo-Gabriola Is.	5.9	25	17	17	50	294	N/A
Vancouver Is.(French Creek)-Lasqueti Is.	16.1	90	3	3	None	40	N/A
Vancouver Is. (Buckley Bay)-Denman Is.	1.9	12	18	18 hrs[2]	30	150	N/A
Campbell River-Quadra Is.	2.8	12	17	17	30	200	4.57
Port McNeill (C)-Sointula (A)/ Alert Bay (B)	A-B:10.5 B-C:12.0 A-C:8.9	35 45 25	7	7	26	100	4.26
Hornby Is.-Denman Is.	1.9	12	12	12	16	150	4.57
Cortes Is.-Quadra Island	9.9	45	6	6	16	145	4.57
d) Coastal Freighters							
Port Alberni (A)-Ucluelet (B)/Bamfield (C)	A-B:80.4 A-C:59.5	10 hrs 8 hrs	1[3]	1	None (32 tonnes freight)	100	N/A
Tofino-Ahousat-Hot Springs Cove		60	2 per week	2 per week	None (23 tonnes freight)	None	N/A
Gold River-Tahsis/Zeballos[4]	N/A	N/A	3 per week	3 per week	None (161 tonnes freight)	100	N/A
Kyuquot-Fair Harbour[4]	N/A	3-4 hrs	1 per week	1 per week	None (63 tonnes freight)	100	N/A

Notes:
[1] 1 additional sailing on Fridays. 1 less sailing Sat., Sun., Stat. Hols.
[2] As many trips as necessary in 18 hr period.
[3] No scheduled sailings Wed. & Fri., Oct 1 - May 31.
[4] Now combined into one service, using the Uchuck III.
[5] Equivalent Automobile Units.
N/A Not available.

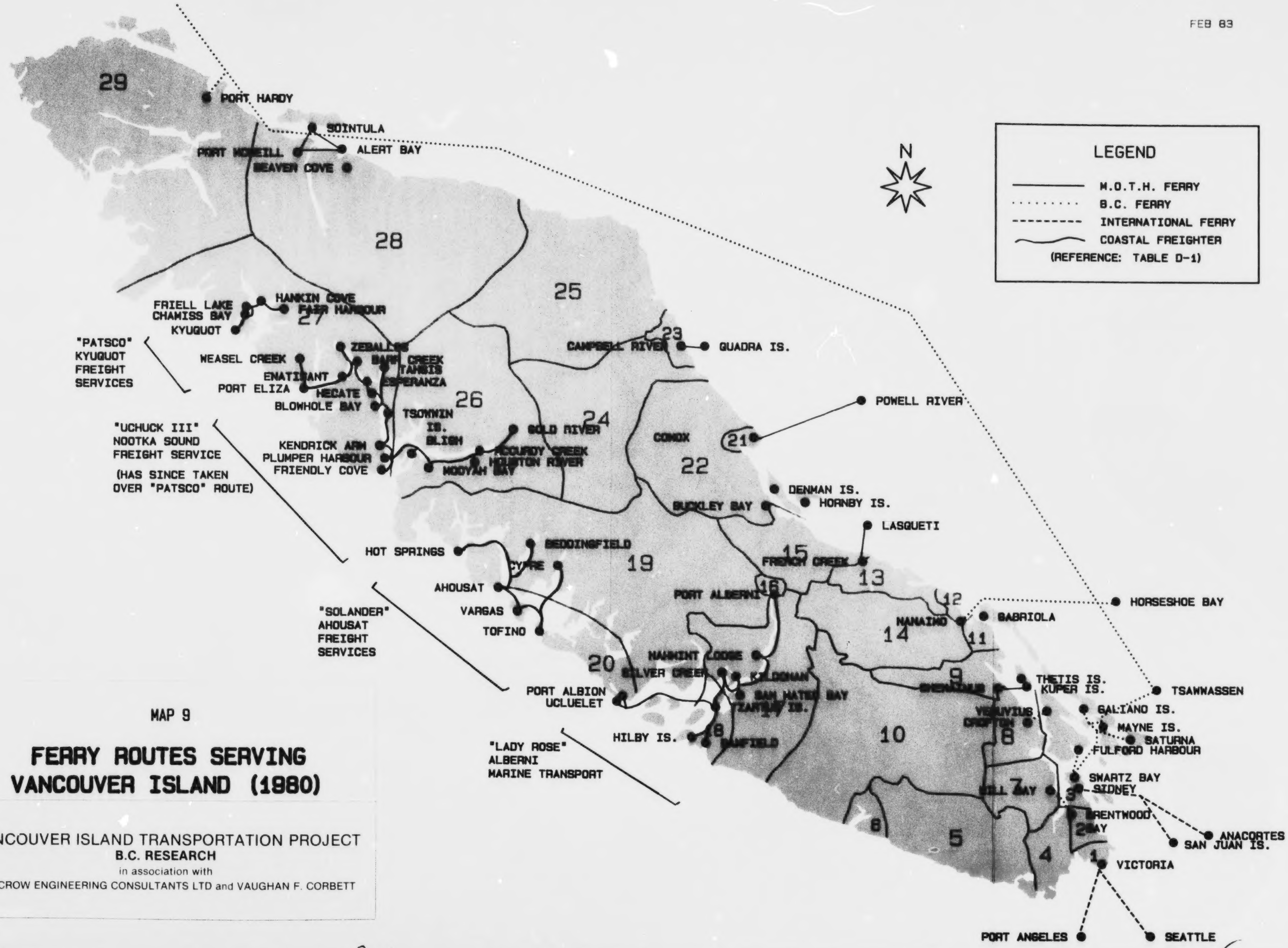
Source: B.C. Ferries, Ministry of Transporation and Highways, Washington State Ferries, Blackball Transportation Inc.

The indication of available capacity on each of the ferry routes is a 'generalized' figure, since it is possible for vessels owned by B.C. Ferries to be assigned to different routes operated by the Corporation, and since most of the Ministry of Transportation and Highways' coastal ferry vessels can be used interchangeably at the landing facilities available at present terminals. Vessels are interchanged during refitting and maintenance, and replaced as warranted by traffic demands. Additional services are also put into operation during the summer months to accommodate seasonal traffic increases.

The major ferry interchange points on Vancouver Island are located near Victoria (at Swartz Bay) and Nanaimo (at Departure Bay). Minor terminals are located at Port Hardy (Bear Cove), Sidney, Nanaimo (C.P.R. Wharf), and Comox (Little River). Landing stages are provided at each end and at intermediate points (where appropriate) of the remaining ferry routes illustrated in Map 9 and listed in Table D-1.

Details of the vessels operated on ferry routes to and from Vancouver Island (or available for back-up purposes) by the B.C. Ferry Corporation and the Ministry of Transportation and Highways are given in Appendices D-1, D-2 and D-3.

FEB 83


LEGEND
M.O.T.H. FERRY
B.C. FERRY
INTERNATIONAL FERRY
COASTAL FREIGHTER
(REFERENCE: TABLE D-1)
N
29
PORT HARDY
SOINTULA
PORT MCNEILL
ALERT BAY
BEAVER COVE
28
25
27
HANKIN COVE
FRIELL LAKE
FAIR HARBOUR
CHAMISS BAY
KYUQUOT
"PATSCO" KYUQUOT FREIGHT SERVICES
ZEBALLOS
WEASEL CREEK
BARR CREEK
TAHSIS
ENATITANT
ESPERANZA
PORT ELIZA
HECATE
BLOWHOLE BAY
26
TSOWWIN IS.
BLIGH
"UCHUCK III" NOOTKA SOUND FREIGHT SERVICE
(HAS SINCE TAKEN OVER "PATSCO" ROUTE)
KENDRICK ARM
PLUMPER HARBOUR
FRIENDLY COVE
MOOYAH BAY
MCCURDY CREEK
HOUSTON RIVER
GOLD RIVER
24
23
CAMPBELL RIVER
QUADRA IS.
POWELL RIVER
COMOX
21
22
DENMAN IS.
HORNBY IS.
BUCKLEY BAY
LASQUETI
15
FRENCH CREEK
13
HOT SPRINGS
BEDDINGFIELD
19
CYPRE
AHOUSAT
VARGAS
TOFINO
"SOLANDER" AHOUSAT FREIGHT SERVICES
PORT ALBERNI
16
12
HORSESHOE BAY
NANAIMO
GABRIOLA
14
11
20
NAHMINT LODGE
SILVER CREEK
KILDONAN
SAN MATEO BAY
TZARTUS IS.
17
PORT ALBION
UCLUELET
HILBY IS.
18
BAMFIELD
"LADY ROSE" ALBERNI MARINE TRANSPORT
9
CHEMAINUS
THETIS IS.
KUPER IS.
TSAWWASSEN
VESUVIUS
CROFTON
GALIANO IS.
MAYNE IS.
SATURNA
FULFORD HARBOUR
10
8
SWARTZ BAY
SIDNEY
7
MILL BAY
3
BRENTWOOD BAY
2
ANACORTES
SAN JUAN IS.
6
5
4
1
VICTORIA
PORT ANGELES
SEATTLE

MAP 9

FERRY ROUTES SERVING VANCOUVER ISLAND (1980)

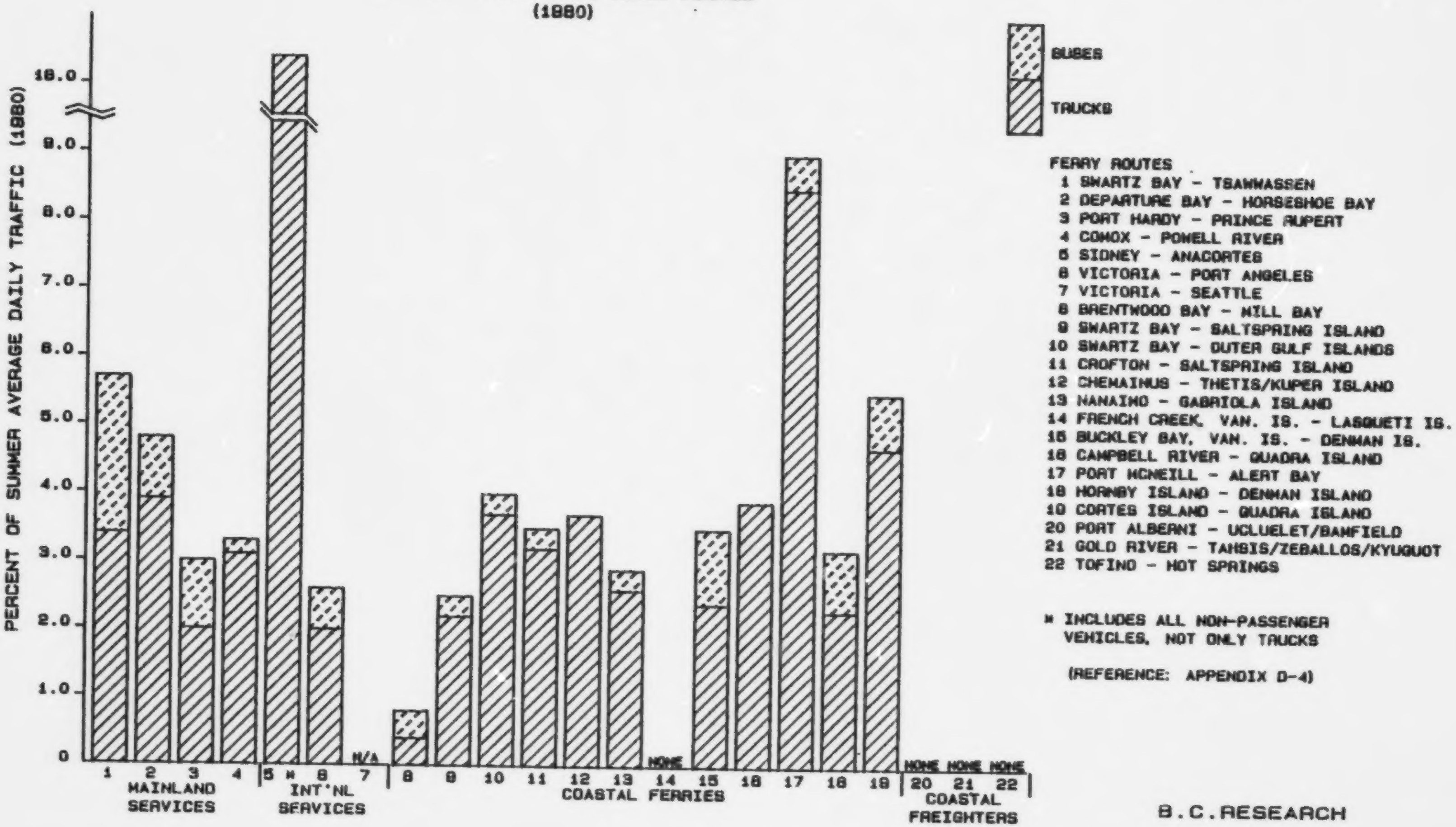
VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

2.0 VEHICLE TRAFFIC ON THE FERRIES

Figure D-1 shows the truck and bus traffic in 1980 on each of the ferry routes as a percentage of the summer average daily vehicle traffic. On most routes, trucks represent approximately 3% to 4% of the total traffic carried during the summer months. The major exceptions are the routes of: Sidney-Anacortes (18%), Port McNeill-Alert Bay (8.5%), and Cortes Island - Quadra Island (4.7%). Buses represent less than one percent of total traffic except on the Swartz Bay - Tsawwassen and Buckley Bay - Denman Island routes where they account for 2.3% and 1.1% respectively. Additional details concerning vehicle composition on ferry routes are given in Appendix D-4.

On all ferry routes there are substantial traffic peaks during the summer months, August being the highest. Figure D-2 illustrates the monthly fluctuations in traffic during 1980 for each route, using January 1980 as the basis for comparison (i.e. the January 1980 count was set at 1.0 and all other monthly counts expressed as a fraction of the January figure). Five general patterns emerge from the 1980 data. The two international ferry routes have very high summer peaks, with the summer count being over ten times the January count. The Port Hardy - Prince Rupert, and Hornby Island - Denman Island routes have the next highest summer peaks (approximately 3.5 times the January figures). Routes having very little monthly variation include Chemainus - Thetis/Kuper Island, Nanaimo - Gabriola Island, and Port McNeill - Alert Bay. On these routes the summer peak is only 1.5 times the January figure. It should be noted that the routes which have low or very low summer peaks tend to be "commuter routes". They connect small communities to places of employment and shopping. Figures for individual ferry routes are given in Appendix D-5.

FIGURE D-1
COMPARISON OF PERCENTAGE TRUCKS AND BUSES
ON VANCOUVER ISLAND FERRY ROUTES
(1980)



FERRY ROUTES
1 SWARTZ BAY - TSAWWASSEN
2 DEPARTURE BAY - HORSESHOE BAY
3 PORT HARDY - PRINCE RUPERT
4 COMOX - POWELL RIVER
5 SIDNEY - ANACORTES
6 VICTORIA - PORT ANGELES
7 VICTORIA - SEATTLE
8 BRENTWOOD BAY - MILL BAY
9 SWARTZ BAY - SALTSPRING ISLAND
10 SWARTZ BAY - OUTER GULF ISLANDS
11 CROFTON - SALTSPRING ISLAND
12 CHEMAINUS - THETIS/KUPER ISLAND
13 NANAIMO - GABRIOLA ISLAND
14 FRENCH CREEK, VAN. IS. - LASQUETI IS.
15 BUCKLEY BAY, VAN. IS. - DENMAN IS.
16 CAMPBELL RIVER - QUADRA ISLAND
17 PORT MCNEILL - ALERT BAY
18 HORNBY ISLAND - DENMAN ISLAND
19 CORTES ISLAND - QUADRA ISLAND
20 PORT ALBERNI - UCLUELET/BAMFIELD
21 GOLD RIVER - TAHSIS/ZEBALLOS/KYUQUOT
22 TOFINO - HOT SPRINGS

* INCLUDES ALL NON-PASSENGER
VEHICLES, NOT ONLY TRUCKS

(REFERENCE: APPENDIX D-4)

B.C.RESEARCH

FIGURE D-2
MONTHLY VEHICLE TRAFFIC PROFILES (1980)
FOR VANCOUVER ISLAND FERRY ROUTES

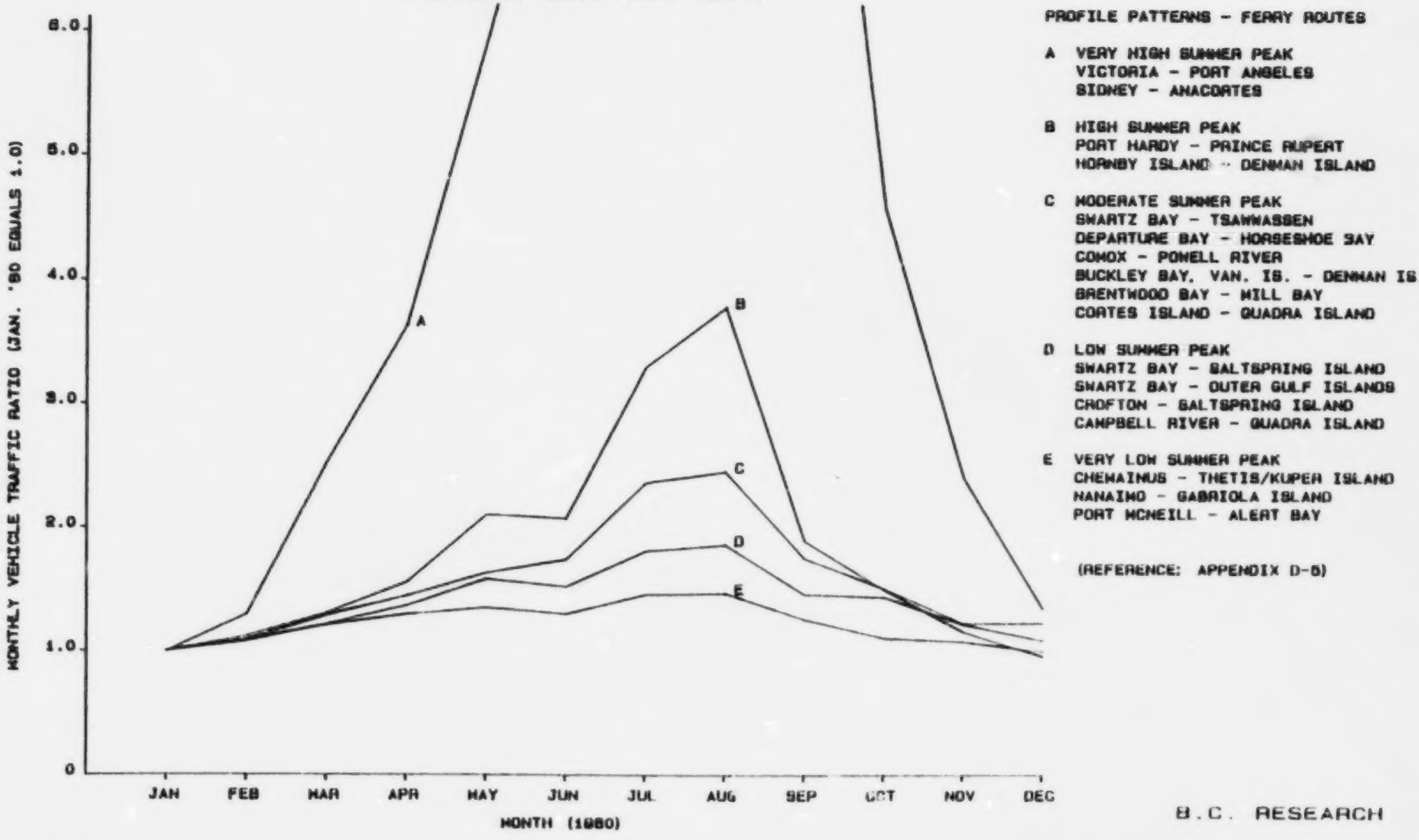
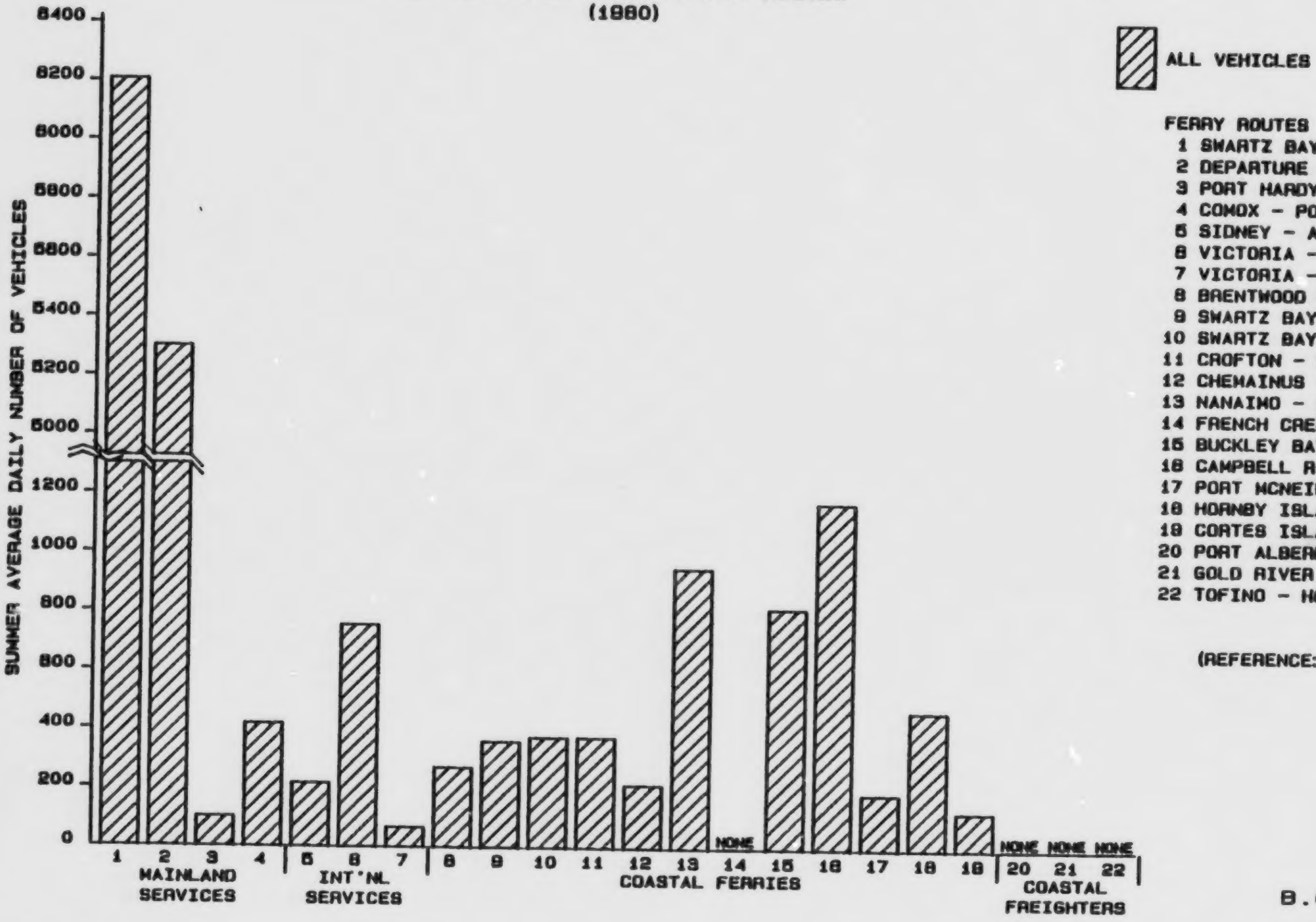


FIGURE D-3
COMPARISON OF SUMMER AVERAGE DAILY VEHICLE TRAFFIC
ON VANCOUVER ISLAND FERRY ROUTES
(1980)



FERRY ROUTES
1 SWARTZ BAY - TSAWWASSEN
2 DEPARTURE BAY - HORSESHOE BAY
3 PORT HARDY - PRINCE RUPERT
4 COMOX - POWELL RIVER
5 SIDNEY - ANACORTES
6 VICTORIA - PORT ANGELES
7 VICTORIA - SEATTLE
8 BRENTWOOD BAY - MILL BAY
9 SWARTZ BAY - SALTSPRING ISLAND
10 SWARTZ BAY - OUTER GULF ISLANDS
11 CROFTON - SALTSPRING ISLAND
12 CHEMAINUS - THETIS/KUPER ISLAND
13 NANAIMO - GABRIOLA ISLAND
14 FRENCH CREEK, VAN. IS. - LASQUETI IS.
15 BUCKLEY BAY, VAN. IS. - DENMAN IS.
16 CAMPBELL RIVER - QUADRA ISLAND
17 PORT MCNEILL - ALERT BAY
18 HORNBY ISLAND - DENMAN ISLAND
19 CORTES ISLAND - QUADRA ISLAND
20 PORT ALBERNI - UCLUELET/BAMFIELD
21 GOLD RIVER - TAHSIS/ZEBALLOS/KYUQUOT
22 TOFINO - HOT SPRINGS

(REFERENCE: APPENDIX D-8)

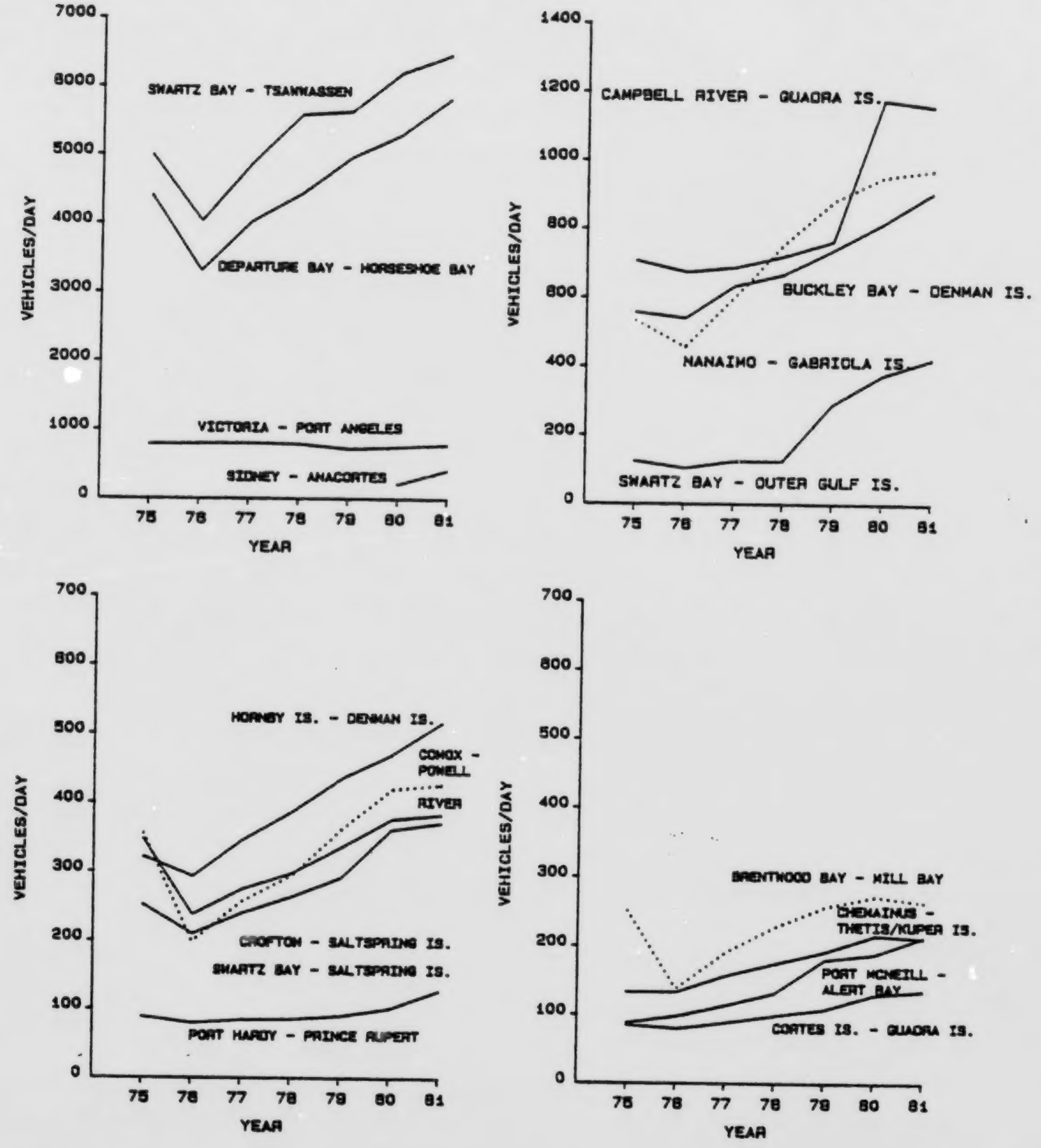
B.C. RESEARCH

Figure D-3 illustrates the summer average daily vehicle traffic on each ferry route during 1980. The two Mainland services (Swartz Bay - Tsawwassen and Departure Bay - Horseshoe Bay) handle the highest volumes, in the order of 6,000 vehicles per day. This is over 10 times the volume on most other routes. When taken together, these two routes account for 63% of the total vehicle traffic on ferries serving Vancouver Island. Three coastal ferry routes (Campbell River - Quadra Island, Nanaimo - Gabriola Island, and Buckley Bay - Denman Island) and the international route of Victoria - Port Angeles handle the next highest volumes during the summer, in the order of 1,000 vehicles per day. One of the coastal ferry routes (French Creek - Lasqueti Island) and the three coastal freighter routes do not carry vehicles. They handle only passengers and freight traffic. Detailed traffic figures are given in Appendix D-6.

Figure D-4 shows the trends in summer average daily vehicle traffic between 1975 and 1981. All routes, except Victoria - Port Angeles, have experienced growth. Most of the annual growth rates have been in excess of 3%, with many over 8%. The two exceptions were Crofton - Saltspring Island, and Brentwood Bay - Mill Bay, where the growth rates were 1.7% and 0.8% respectively.

Two routes, Campbell River - Quadra Island and Swartz Bay - Outer Gulf Islands, experienced substantial increases in volume between 1978 and 1981. Vessel capacity was significantly upgraded during this period. Most routes showed sharp declines in 1976, possibly in response to the general tariff increase introduced that year. In nearly all cases, however, the loss in traffic during 1976 was recovered by 1978. In general, vehicle traffic on the ferry routes serving Vancouver Island has grown faster than the population in the areas served by the ferry routes. In most cases the rate of traffic growth is at least double, and on some routes more than triple, the rate of population growth in the regions served by these routes.

FIGURE D-4
SUMMER AVERAGE DAILY VEHICLE TRAFFIC
FOR VANCOUVER ISLAND FERRY ROUTES, 1975 - 1981



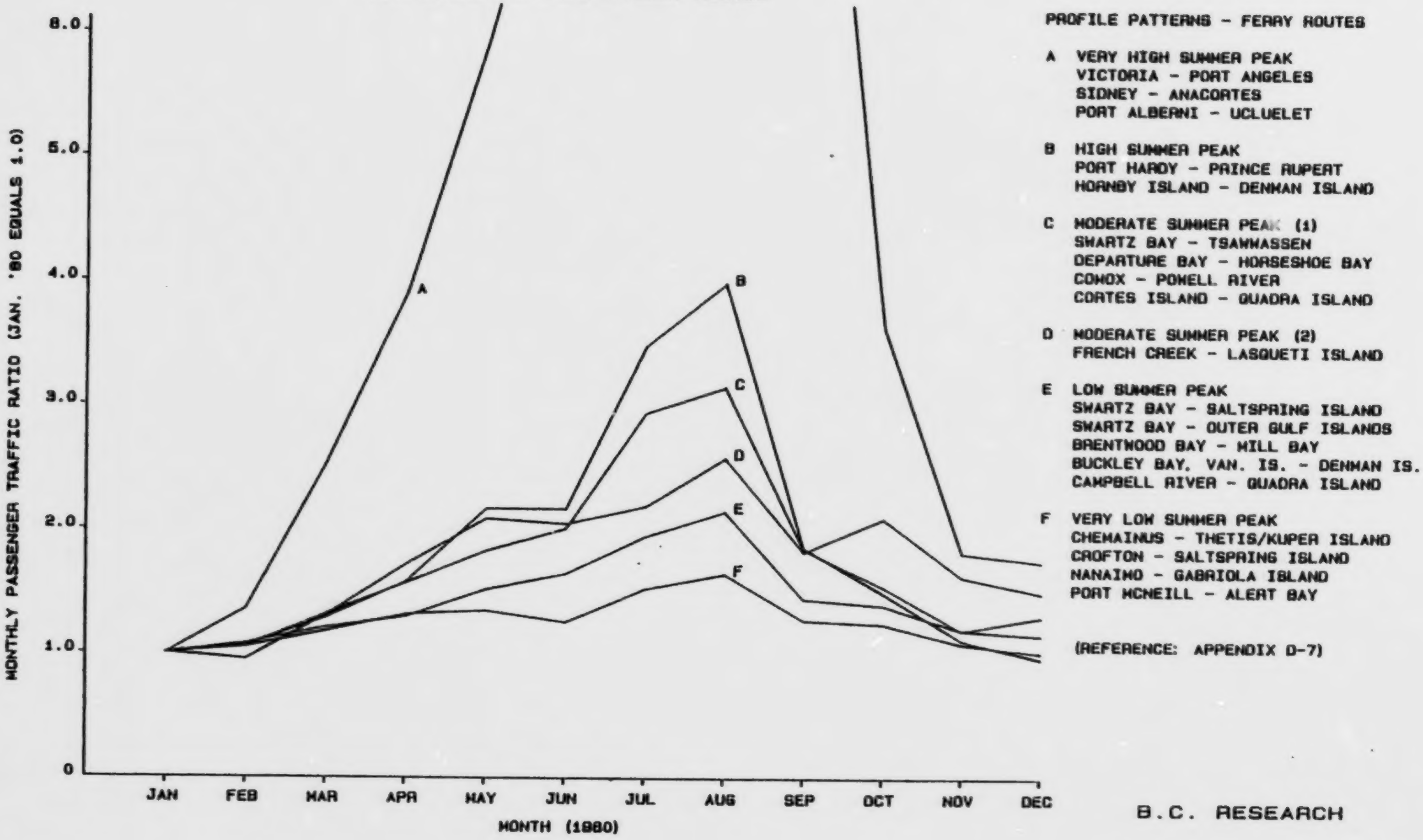
(REFERENCE: APPENDIX D-6)

3.0 PASSENGER TRAFFIC ON THE FERRIES

The seasonal patterns observed for vehicle traffic on the ferries are also reflected in the monthly passenger statistics. Figure D-5 illustrates the six general patterns which emerged. Again, it can be seen that the two international routes have extremely high summer volumes compared to their January passenger carryings. The Port Alberni - Ucluelet coastal freighter traffic follows a pattern similar to that of the international routes, with the summer months recording over twenty times the January passenger volumes. The Port Hardy - Prince Rupert and Hornby Island - Denman Island routes have the next highest summer passenger traffic peaks, as was the case with vehicle traffic. The four routes showing the least seasonal variation include Crofton - Saltspring Island, Chemainus - Thetis/Kuper Island, Nanaimo - Gabriola Island, and Port McNeill - Alert Bay. Only one of these four, Crofton - Saltspring Island, did not follow this same pattern for vehicle traffic. Two other routes, Buckley Bay - Denman Island and Brentwood Bay - Mill Bay, also deviated from their vehicle-based seasonal patterns. In all three cases, the passenger statistics show less summer peaking than the vehicle statistics. Individual route statistics for 1980 are given in Appendix D-7.

Figure D-6 and Map 10 provide a comparison of summer average daily passenger traffic figures in 1980 for the various routes. Again it can be seen that each of the Mainland routes (Swartz Bay - Tsawwassen and Departure Bay - Horseshoe Bay) recorded summer passenger volumes far above those of other routes. These two routes together account for 67% of the total ferry passenger traffic.

FIGURE D-5
MONTHLY PASSENGER TRAFFIC PROFILES (1980)
FOR VANCOUVER ISLAND FERRY ROUTES



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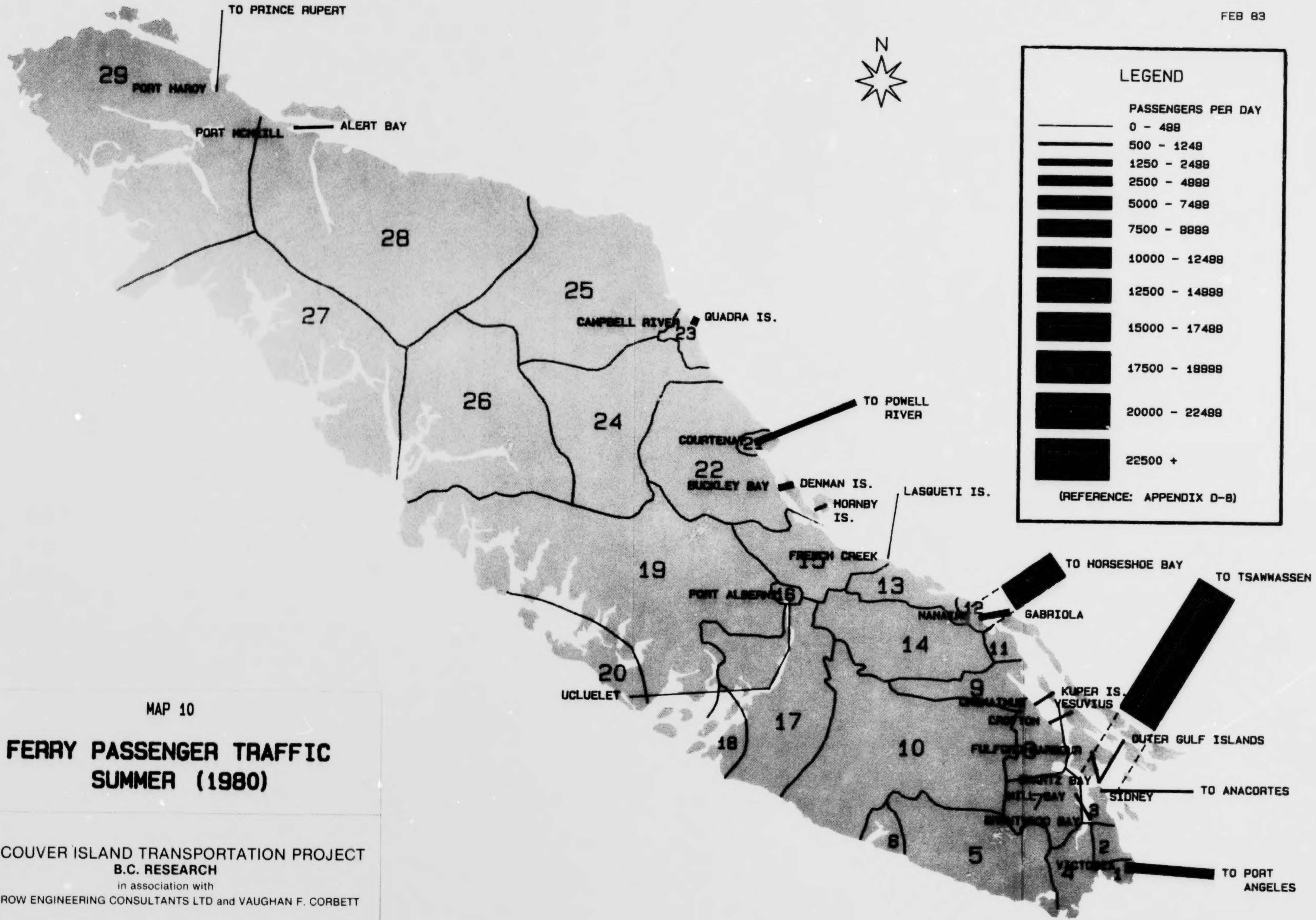
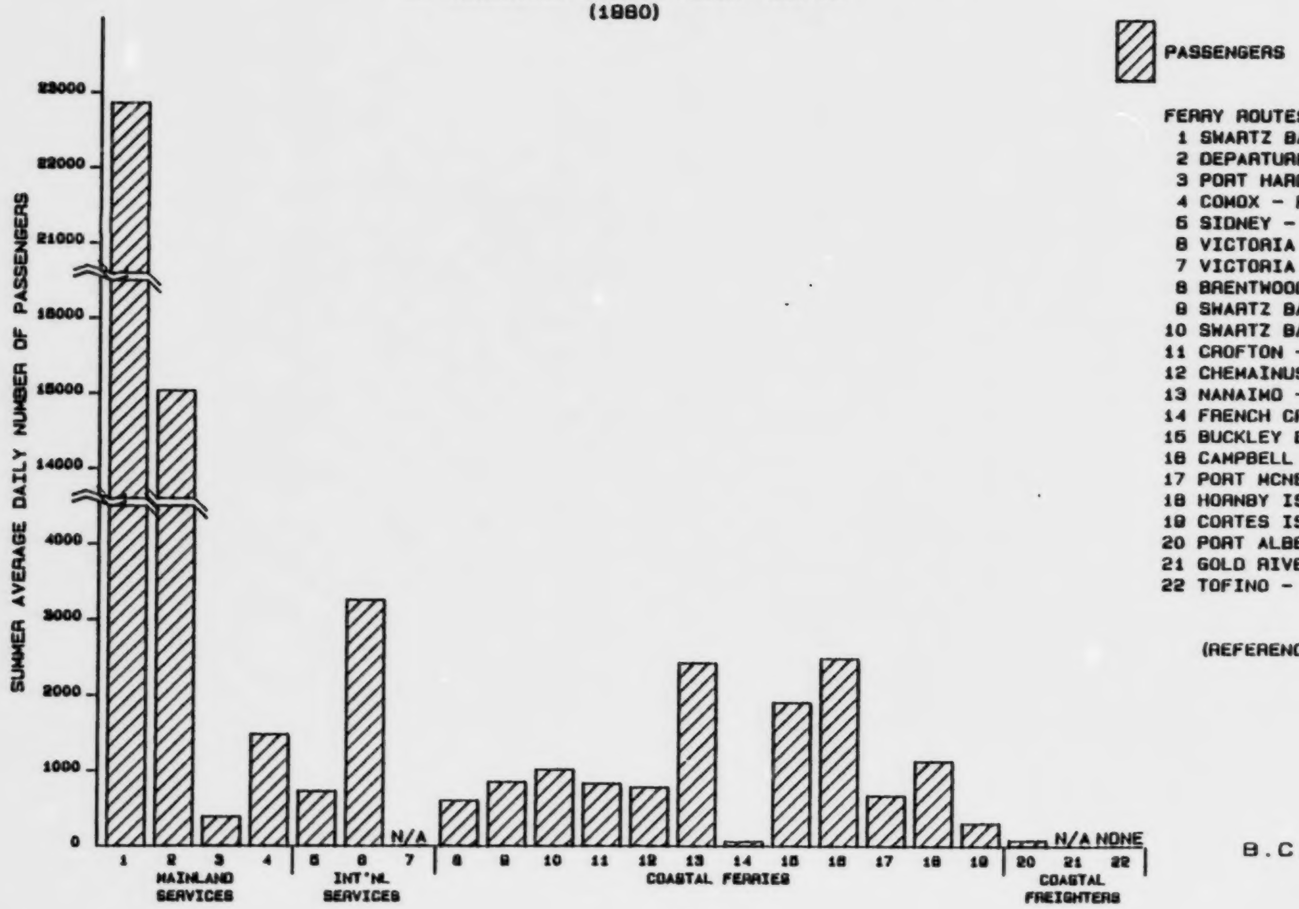

FEB 83
N
LEGEND
PASSENGERS PER DAY
0 - 499
500 - 1249
1250 - 2499
2500 - 4999
5000 - 7499
7500 - 9999
10000 - 12499
12500 - 14999
15000 - 17499
17500 - 19999
20000 - 22499
22500 +
(REFERENCE: APPENDIX D-8)
TO PRINCE RUPERT
29
PORT HARDY
PORT MCNEILL
ALERT BAY
28
27
25
CAMPBELL RIVER
23
QUADRA IS.
26
24
TO POWELL RIVER
COURTENAY
21
22
BUCKLEY BAY
DENMAN IS.
HORNBY IS.
LASQUETI IS.
19
FRENCH CREEK
15
13
PORT ALBERNI
16
TO HORSESHOE BAY
TO TSAWWASSEN
NANAIMO
12
GABRIOLA
14
11
20
UCLUELET
9
CHEMAINUS
KUPER IS.
VESUVIUS
CROFTON
17
18
10
FULFORD HARBOUR
OUTER GULF ISLANDS
SWARTZ BAY
SIDNEY
TO ANACORTES
MILL BAY
7
3
BRENTWOOD BAY
6
5
2
VICTORIA
4
1
TO PORT ANGELES

MAP 10

FERRY PASSENGER TRAFFIC SUMMER (1980)

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

FIGURE D-6
COMPARISON OF SUMMER AVERAGE DAILY PASSENGER TRAFFIC
ON VANCOUVER ISLAND FERRY ROUTES
(1980)



FERRY ROUTES
1 SWARTZ BAY - TSAWWASSEN
2 DEPARTURE BAY - HORSESHOE BAY
3 PORT HARDY - PRINCE RUPERT
4 COMOX - POWELL RIVER
5 SIDNEY - ANACORTES
6 VICTORIA - PORT ANGELES
7 VICTORIA - SEATTLE
8 BRENTWOOD BAY - MILL BAY
9 SWARTZ BAY - SALTSPRING ISLAND
10 SWARTZ BAY - OUTER GULF ISLANDS
11 CROFTON - SALTSPRING ISLAND
12 CHEMAINUS - THETIS/KUPER ISLAND
13 NANAIMO - GABRIOLA ISLAND
14 FRENCH CREEK, VAN. IS. - LASQUETI IS.
15 BUCKLEY BAY, VAN. IS. - DENMAN IS.
16 CAMPBELL RIVER - QUADRA ISLAND
17 PORT MCNEILL - ALERT BAY
18 HORNBY ISLAND - DENMAN ISLAND
19 CORTES ISLAND - QUADRA ISLAND
20 PORT ALBERNI - UCLUELET/BAMFIELD
21 GOLD RIVER - TAHSIS/ZEBALLOS/KYUQUOT
22 TOFINO - HOT SPRINGS

(REFERENCE: APPENDIX D-8)

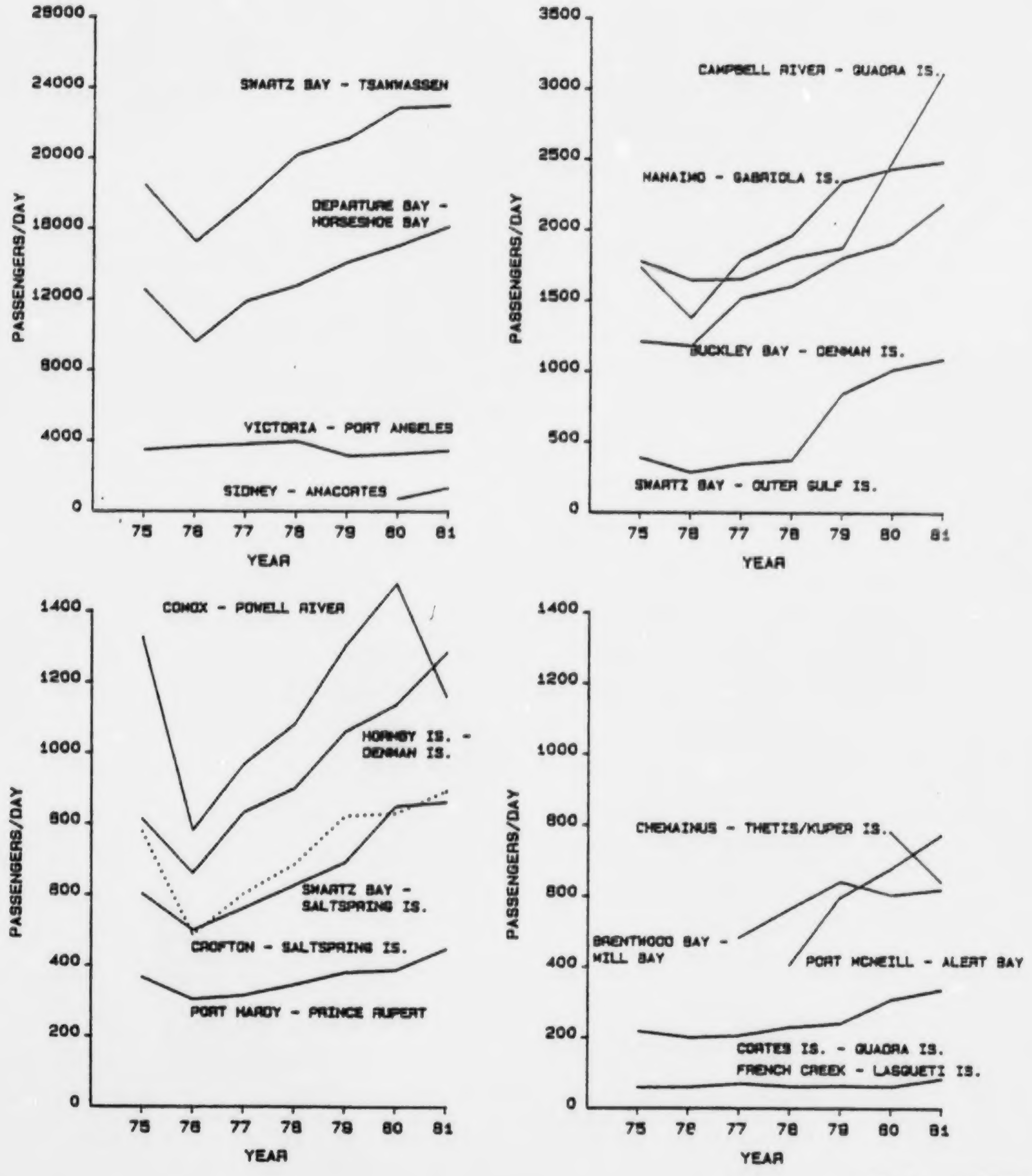
B.C. RESEARCH

The Victoria - Port Angeles, Nanaimo - Gabriola Island, and Campbell River - Quadra Island Routes have the next highest passenger volumes, with over 2,000 passengers/day during the summer months. Buckley Bay - Denman Island, Comox - Powell River, Hornby Island - Denman Island, and Swartz Bay - Outer Gulf Islands each handle between 1,000 and 2,000 passengers/day.

Figure D-7 illustrates the trends in these summer average daily passenger figures over the period from 1975 to 1981. The patterns are similar to those observed for vehicle traffic. Growth has been recorded for all routes except the Comox - Powell River and Victoria - Port Angeles routes. For the other routes, growth rates were usually over three percent per annum, with several well over six percent. Only Crofton - Saltspring Island and Chemainus - Thetis/Kuper Island (excluding the two routes where traffic declined) had growth rates less than 3%. These growth rates usually exceed the population growth rates in the areas served by each ferry route by factors of 1.5 to 2.5.

As was observed for vehicle traffic, passenger traffic on most routes declined from 1975 to 1976. This was possibly in response to the general fare increases introduced at the start of 1976. In most cases the 1975 traffic levels were regained by 1978 and, as was stated above, have now been well surpassed. Detailed figures are provided in Appendix D-8.

FIGURE D-7
SUMMER AVERAGE DAILY PASSENGER TRAFFIC
FOR VANCOUVER ISLAND FERRY ROUTES, 1975 - 1981



B.C. RESEARCH

(REFERENCE: APPENDIX D-8)

4.0 FERRY TRAFFIC PROJECTIONS

Given the high growth rates in both vehicle and passenger traffic from 1975 to 1981 on nearly all ferry routes, it would appear reasonable to assume some continuation of this strong growth. In most cases, the growth rate during this period was two to three times that of population growth in the regions served by the ferry routes.

It is doubtful that very high growth rates of 9 to 10% per annum could be maintained over the 20-year projection period. Thus, it was assumed that routes showing such high growth rates in the recent past would continue to expand at twice the rate of the population growth projected for their surrounding Vancouver Island areas. For routes showing moderate growth, the projected population growth rate was used.

For the four routes providing services to the B.C. Mainland, a different approach was adopted. Since historic traffic figures were available for these routes back to 1970, linear regression was used to derive long-term trend lines from 1970 to 1981. These trend lines were then extrapolated to 2001, with growth rates ranging from 2.3% to 4.0% (for comparison, the projected population growth rate for Vancouver Island is 2.1%, see Appendix B-1). The growth rate assumptions and the resulting vehicle and passenger traffic projections are shown in Tables D-2 and D-3 respectively.

Vehicle traffic on the ferries is projected to grow at an average rate of 2.8% per annum, from the total carryings of 19,600 vehicles per day in the summer of 1981 to an estimated 34,200 vehicles per day in summer 2001. This is a substantial increase in traffic loads and modification to some of the sailing schedules, vessel capacities, and terminal facilities

TABLE D-2

PROJECTED SUMMER AVERAGE DAILY VEHICLE TRAFFIC* ON FERRY ROUTES

Ferry	Actual 1981	Growth Rate	Projected 1986	1991	1996	2001
a) Mainland Services						
Swartz Bay - Tsawwassen	6,473	2.3%	7,200	8,100	9,100	10,200
Departure Bay - Horseshoe Bay	5,831	2.6	6,600	7,500	8,600	9,700
Port Hardy - Prince Rupert	128	4.0	160	190	230	280
Comox - Powell River	426	4.0	520	630	770	930
b) International Services						
Sidney - Anacortes	420	0.8	440	450	470	490
Victoria - Port Angeles	791	0.8	820	860	890	930
Victoria - Seattle		NOT AVAILABLE				
c) Coastal Ferries						
Brentwood Bay - Mill Bay	263	2.8	300	350	400	460
Swartz Bay - Saltspring Is.	371	3.0	430	500	580	670
Swartz Bay - Outer Gulf Is.	423	3.0	490	570	660	760
Crofton - Saltspring Is.	383	2.6	430	490	560	640
Chemainus - Thetis/Kuper Is.	211	2.5	240	270	310	350
Nanaimo - Gabriola Is.	972	5.2	1,250	1,610	2,080	2,680
French Creek - Lasqueti Is.		PASSENGERS ONLY				
Buckley Bay - Denman Is.	907	3.6	1,080	1,290	1,540	1,840
Campbell River - Quadra Is.	1,158	3.5	1,380	1,630	1,940	2,300
Port McNeill - Alert Bay	213	5.8	280	370	500	660
Hornby Is. - Denman Is.	516	3.6	620	730	880	1,050
Cortes Is. - Quadra Is.	135	3.5	160	190	230	270
d) Coastal Freighters						
Port Alberni - Ucluelet/Bamfield	PASSENGERS AND FREIGHT ONLY					
Gold River - Tahsis	PASSENGERS AND FREIGHT ONLY					
Tofino - Hot Springs			FREIGHT ONLY			
TOTAL	19,621	2.8%	22,400	25,730	29,740	34,210

* Total traffic, both directions.

TABLE D-3

PROJECTED SUMMER AVERAGE DAILY PASSENGER TRAFFIC* ON FERRY ROUTES

Ferry	Actual 1981	Growth Rate	Projected			
			1986	1991	1996	2001
a) Mainland Services						
Swartz Bay - Tsawwassen	22,990	2.3%	23,920	24,900	25,900	26,960
Departure Bay - Horseshoe Bay	16,127	2.6	18,340	20,850	23,700	26,950
Port Hardy - Prince Rupert	449	4.0	550	660	810	980
Comox - Powell River	1,159	4.0	1,410	1,720	2,090	2,540
b) International Services						
Sidney - Anacortes	1,361	0.8	1,420	1,470	1,530	1,600
Victoria - Port Angeles	3,457	0.8	3,600	3,740	3,900	4,050
Victoria - Seattle			NOT AVAILABLE			
c) Coastal Ferries						
Brentwood Bay - Mill Bay	619	2.8	710	820	940	1,080
Swartz Bay - Saltspring Is.	862	3.0	1,000	1,160	1,340	1,560
Swartz Bay - Outer Gulf Is.	1,090	3.0	1,260	1,460	1,700	1,970
Crofton - Saltspring Is.	893	2.6	1,020	1,150	1,310	1,490
Chemainus - Saltspring Is.	640	2.5	720	820	930	1,050
Nanaimo - Gabriola Is.	2,487	5.2	3,200	4,130	5,320	6,850
French Creek - Lasqueti Is.	85	3.6	100	120	140	170
Buckley Bay - Denman Is.	2,187	3.6	2,610	3,110	3,720	4,440
Campbell River - Quadra Is.	3,110	3.5	3,690	4,390	5,210	6,190
Port McNeill - Alert Bay	772	5.8	1,020	1,360	1,800	2,380
Hornby Is. - Denman Is.	1,284	3.6	1,530	1,830	2,180	2,600
Cortes Is. - Quadra Is.	336	3.5	400	470	560	670
d) Coastal Freighters						
Port Alberni - Ucluelet/Bamfield	28	1.1	30	30	30	30
Gold River - Tahsis		NOT AVAILABLE				
Tofino - Hot Springs	NO PASSENGERS, FREIGHT ONLY					
TOTAL	59,936	2.2%	66,530	74,190	83,110	93,560

* Including drivers of vehicles. Total traffic, both directions.

will likely be necessary in order to cope with this demand. A comparison of projected traffic levels on each route with the current vessel capacities and sailing schedules (shown previously in Table D-1) suggest the following potential problem areas.

Major capacity increases are indicated:

Nanaimo - Gabriola Is.
Buckley Bay - Denman Is.
Campbell River - Quadra Is.
Port McNeill - Alert Bay
Hornby Is. - Denman Is.

Minor capacity increases are indicated:

Nanaimo - Horseshoe Bay
Comox - Powell River
Brentwood Bay - Mill Bay
Swartz Bay - Outer Gulf Is.
Cortes Is. - Quadra Is.

With respect to passenger traffic, the average growth rate is projected to be slightly less than for vehicle traffic at 2.2% per annum, from the total carryings of 60,000 passengers per day in the summer of 1981 to an estimated 93,500 in summer 2001. While this increase is not as great as the vehicle increase, it can still pose capacity problems for some of the routes. Analysis of existing capacities and schedules suggests the following potential problems.

Major capacity increases are indicated:

Port Hardy - Prince Rupert
Port McNeill - Alert Bay

Minor capacity increases are indicated:

Victoria - Port Angeles
French Creek - Lasqueti Is.
Campbell River - Quadra Is.

It should be noted that these projections assume that there will be no significant changes in vehicle occupancy rates and that the public road system will be up-graded as required to handle the increased vehicle volumes being discharged from ferries. Even now the "superferries" and the "stretched" ferries are beginning to cause problems for streets near the ferry terminals because of the ferries' high discharge rates. They also assume that ferry schedules, terminal facilities and vessel capacities can and will be adjusted to accommodate these traffic volumes.

These projections also assume that there will be a consistent fare structure across all ferry routes and compared to other modes of transportation. Thus, for example, it is assumed that future fares will follow the cost of living index applied to current rates and will not be used as a method of managing ferry usage.

5.0 SUMMARY

Vancouver Island is served by a comprehensive system of 26 ferry routes providing essential access to the many communities and smaller islands around its circumference. They link Vancouver Island with the Lower Mainland, Northern British Columbia, the Sunshine Coast and the United States. On most routes, both vehicle and passenger services are offered although three carry passengers only (French Creek - Lasqueti Island, Port Alberni - Ucluelet/Bamfield and Gold River - Tahsis) and one (Tofino - Hot Springs) provides only freight service.

In 1980, the two major ferry services to the B.C. Lower Mainland (Swartz Bay - Tsawwassen and Departure Bay - Horseshoe Bay) accounted for 63% and 67% of the total vehicle and passenger traffic on all the ferries serving Vancouver Island. These two routes each handled in the order of 6,000 vehicles per day and 18,000 passengers per day during the summer months. On all ferry routes, there are substantial traffic peaks during the summer, with the July counts as much as 10 times the January levels on some routes.

Both vehicle and passenger traffic levels have exhibited significant growth between 1975 and 1981 on most of the ferry routes. Growth rates have generally been from 1.5 to 2.5 times the corresponding rates of population growth in the areas served by these routes.

Traffic projections prepared in this study suggest that, by the year 2001, summer traffic levels on the ferries serving Vancouver Island will reach 34,200 vehicles per day (up from 19,600 in 1981) and 93,500 passengers per day (up from 60,000 in 1981). In order that these volumes can be properly accommodated, several routes will likely require modifications to sailing schedules, vessel capacities and/or terminal facilities.

E. COMMERCIAL VEHICLES

E. COMMERCIAL VEHICLES

1.0 BUS SERVICE

Bus services can be categorized simply into two types:

- transit or "within-city" services; and
- inter-urban services.

1.1 Transit Services

B.C. Transit, a Crown Agency, and Metro Transit Operating Company, a Crown Corporation, provide transit bus services within several communities on Vancouver Island, including Greater Victoria, Nanaimo, Campbell River and Port Alberni. The actual operation of services provided by B.C. Transit is contracted out to three companies:

Nanaimo - Nanaimo Regional Transit System (Regional District of Nanaimo)

Campbell River - Campbell River Bus & Transportation Inc. (Subsidiary of Independent Bus & Transportation Inc.);

Port Alberni - Western Bus Lines (Port Alberni) Ltd.

Metro Transit Operating Company operates the services in the Greater Victoria area. Prior to the formation of Metro Transit in April 1979, these services had been the responsibility of B.C. Hydro and Power Authority.

To the extent that these buses operate solely within the boundaries of each municipality, they are outside the scope of this project. Although transit services frequently connect adjacent municipalities, thereby offering a form of inter-city bus service, they are not usually express or non-stop services and are, therefore, excluded from this study. For example, in the Greater Victoria area it is possible to ride Metro Transit buses from downtown Victoria to the Swartz Bay ferry terminal. This is a slow, round about route which is not considered to be "inter-urban" services in the context of the current study.

1.2 Inter-Urban Bus Services

The primary focus of this chapter, as far as commercial bus services are concerned, is the major bus routes which operate on the highway network between municipalities on Vancouver Island and on the main ferry links between the Island and the Lower Mainland. These inter-urban bus routes provide regular, scheduled passenger and express freight services (up to 45 kg.). Other bus services are available, on a charter basis, for transporting school children and visitors. These charter services are not considered in the context of the current study.

As of 1980, there were only two companies providing regular, scheduled combined passenger and freight services to, from, and on Vancouver Island:

- Pacific Coach Lines Ltd. (PCL)

  operating between Vancouver and Victoria/Nanaimo via B.C. Ferries, and also over the Vancouver Island highway system connecting Victoria, Nanaimo, Port Alberni, Courtenay/Comox, Campbell River, Gold River, Sayward, Port McNeill and Port Hardy.

  [In May 1981, PCL ceased operations between Campbell River and Gold River, and Ross Taxi took up this service using taxis.]

- Orient Stage Lines (OSL) Ltd.

  operating between Port Alberni and Tofino/Ucluelet, by means of a bus service integrated with PCL services at Port Alberni.

The routes followed by these companies are illustrated in Map 11. Major bus interchanges are located at Victoria, Nanaimo and Campbell River. Both buses and drivers are based at each of these main depots. Smaller interchanges occur at Port Alberni and Port Hardy where PCL parks buses overnight in order to achieve its scheduled runs. Staging points, where scheduled routes terminate and begin, or where buses wait for a scheduled 5-10 minute break when on routes between major interchanges, are located at Duncan, Parksville, Courtenay, Gold River, Tofino and Ucluelet. Maintenance of PCL vehicles is undertaken in Victoria and in Vancouver and simple repairs can be carried out at Nanaimo and Campbell River.

OSL's base of operations is in Port Alberni, where vehicles are stored and maintained and where the Company's offices are located.

Pacific Coach Lines provides scheduled services in the fall/winter period (Sept. 17 - June 1) for Island residents and winter visitors. In summer months (June 1 - Sept. 17), scheduled runs are increased substantially to accommodate the market demand. In addition, the PCL service is, to a certain extent, demand-responsive. Extra vehicles are added to scheduled services if demand warrants them. This is particularly evident on the ferry/bus services. Here, new passengers are ticketed on the ferry (these people having boarded the ferry as foot passengers), and additional buses are sent to meet the ferry at its destination terminal if insufficient capacity is available on the buses already carried on the ferry. PCL also has a contractual arrangement with a few airlines (e.g. Air B.C., Pacific Western) flying into the northern part of Vancouver Island. Under these arrangements, whenever inclement weather prevents flights from departing, PCL will transport air passengers to other airports not affected by adverse conditions.

During summer months, with the general increase in traffic on the road system, PCL buses experience delays due to traffic congestion. To date this has not resulted in buses missing ferry connections, since the PCL schedules allow for local traffic, weather, and other conditions affecting travel times.

Orient Stage Lines operates a fixed schedule throughout the year between Port Alberni and Ucluelet/Tofino, providing a regular passenger and - of equal importance in this area - freight service between these communities.

Most communities on Vancouver Island with a 1981 population of over 1,500 persons are served by either PCL or OSL. The municipalities of Chemainus, Comox and Cumberland, while not directly on an inter-urban bus route, are located just off the main highways along which the inter-urban buses operate. The only communities which are neither near main routes nor linked to them by local bus services are Lake Cowichan, Youbou, Tahsis and Port Alice.

Table E-1 lists the main inter-urban bus routes operating on Vancouver Island, and between the Island and Lower Mainland. It gives details on distances and travel times (which vary due to stops made en route), number of one-way trips made per day in 1982 (by direction and season), and vehicle seating capacities (based on the vehicles allocated to routes over a one week survey period in January, 1981).

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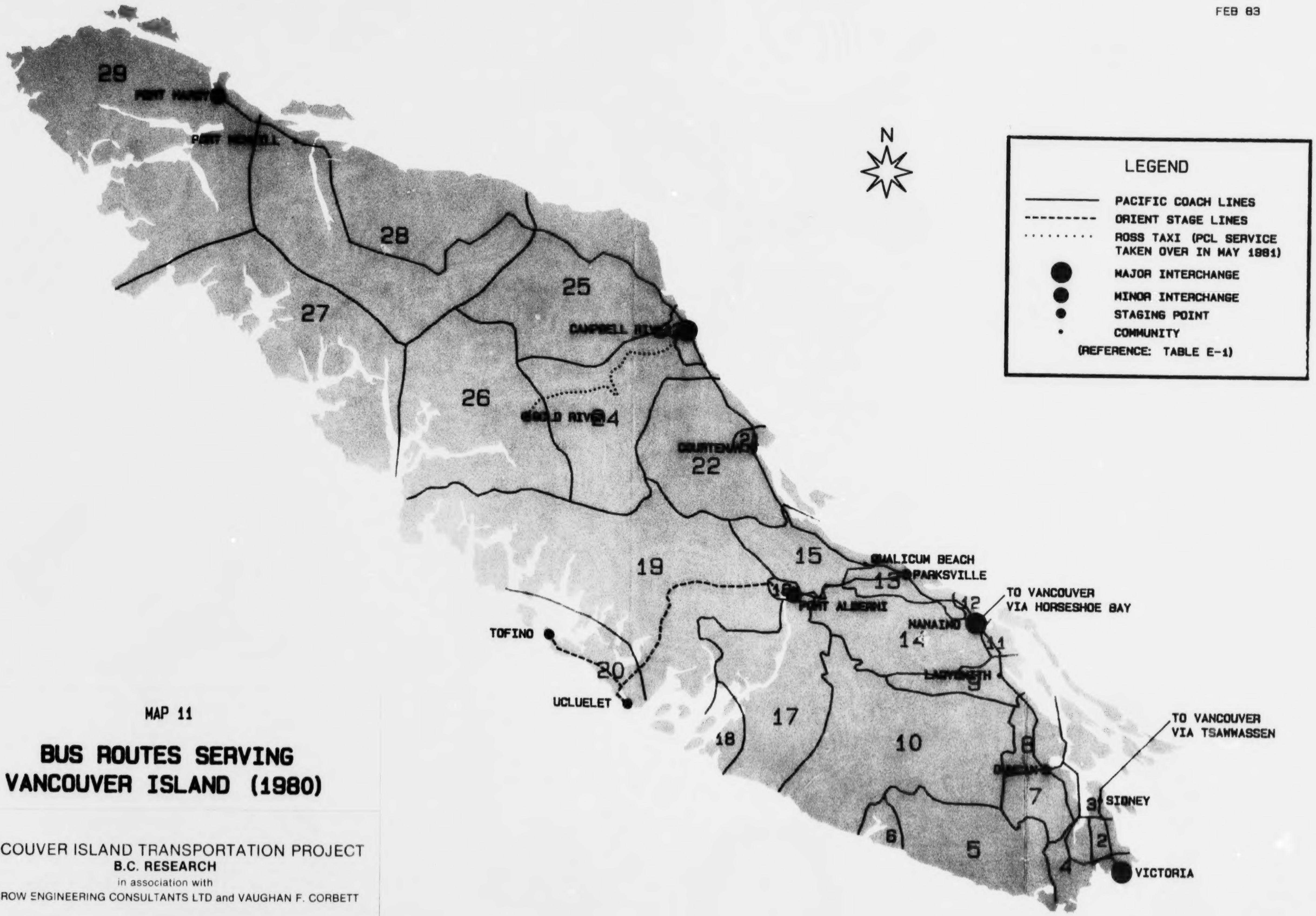

N
LEGEND
PACIFIC COACH LINES
ORIENT STAGE LINES
ROSS TAXI (PCL SERVICE TAKEN OVER IN MAY 1981)
MAJOR INTERCHANGE
MINOR INTERCHANGE
STAGING POINT
COMMUNITY
(REFERENCE: TABLE E-1)
29
PORT HARDY
PORT MCNEILL
28
27
25
CAMPBELL RIVER
26
GOLD RIVER
24
COURTENAY
23
22
19
15
QUALICUM BEACH
PARKSVILLE
13
16
PORT ALBERNI
TO VANCOUVER VIA HORSESHOE BAY
12
NANAIMO
14
11
TOFINO
20
UCLUELET
LADYSMITH
9
17
18
10
8
DUNCAN
TO VANCOUVER VIA TSAWWASSEN
7
3
SIDNEY
6
5
2
4
VICTORIA

MAP 11

BUS ROUTES SERVING VANCOUVER ISLAND (1980)

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

TABLE E-1

INTER-URBAN BUS SERVICES

Route Name	Distance (kms)	Travel Time (mins)	Hours of Operation (Time at Origin)		Number of One-Way Services/ Day, (1982)		Vehicle Capacity (Jan/81)	Seats/ Day (Jan/81)	% Occupancy
			Winter	Summer	Winter[1]	Summer[1]			
Victoria - Vancouver	120	205	0600-2030	0600-2100	8	16	50	796	64
Vancouver - Victoria			0550-1950	0550-2050	8	16	50	847	65
Nanaimo - Vancouver	90	170	0600-2030	0630-2030	8	12[2]	45	584	69
Vancouver - Nanaimo			0605-2005	0605-2105	8	12[2]	46	598	67
Victoria - Duncan	60	50-85	0515-1810	0515-2030	9[3]	9	N/A	N/A	N/A
Duncan - Victoria			0625-2205	0625-2220	8[3]	10			
Duncan - Nanaimo	51	55-75	0725-1920	0710-2135	7[4]	9	N/A	N/A	N/A
Nanaimo - Duncan			0600-2100	0600-2115	7[4]	9			
Nanaimo - Port Alberni	84	90-95	1105-2100	1105-2100	3	3	47	141	N/A
Port Alberni - Nanaimo			0845-1845	0845-1845	3	3	47	94	N/A
Nanaimo - Courtenay	108	105-117	0900-2100	1000-2115	5[5]	6,	N/A	N/A	N/A
Courtenay - Nanaimo			0810-1850	0915-1910	5	5[6]			
Courtenay - Campbell River	45	40-50	1110-2255	1205-2100	5[5]	6,	N/A	N/A	N/A
Campbell River - Courtenay			0715-1715	0715-1715	5	5[6]			
Campbell River - Port Hardy	243	250	1230 except Mon.-1630	1330	1	1	47	47	N/A
Port Hardy - Campbell River			0745	0745	1	1[7]	47	47	N/A
Port Alberni (A) - Ucluelet (B)/Tofino(C)	A-C: 122	A-C: 100	1235	1235	1	1	33/37	33/37	N/A
Ucluelet(B)/Tofino(C) - Port Alberni(A)	C-B: 42	C-B: 60	1530(C)	1530(C)	1	1	33/37	33/37	N/A
Campbell River - Gold River	91	90	1230	1230	1[8]	1[8]	41[9]	41[9]	N/A
Gold River - Campbell River			1000	1000	1[8]	1[8]	41[9]	41[9]	N/A

[1] Fall/Winter schedule: Sept. 17 - June 1; Spring/Summer schedule: June 1 - Sept. 17
[2] Summer services shown for June 24 - Sept. 14; 4 services less June 1 - 24/Sept. 14-17
[3] Vacations on weekends/holidays
[4] Additional services on weekends/holidays
[5] Additional service on Mondays
[6] Additional daily express service, Campbell River - Courtenay - Nanaimo
[7] Additional services to connect with B.C. Ferry at Port Hardy (Bear Cove)
[8] Service only operates Sun., Tues., Thurs., Fri. (winter and summer)
[9] Since May 14, 1981 service vehicles are 5 passenger taxis.

Source: Pacific Coach Lines, Orient Stage Lines

The three columns at the extreme right of the table indicate the total daily seating capacity provided on each route, as of January 1981. The capacity shown in the first of these columns is the product of the number of one-way services per day and the typical vehicle seating capacity. These figures assume that one "typical" vehicle is available for each scheduled departure. The middle column gives the actual number of seats per day that were available. The differences between these two capacities reflect multiple bus assignments to scheduled departures (in response to demand for service) and the occasional assignment of atypical vehicles. The right-most column gives an estimate of the average daily seat occupancy for the four bus routes using the ferries, again as observed during the January 1981 survey period.

An inventory of PCL and OSL passenger vehicles is given in Appendices E-1 and E-2, along with an indication of the general allocation of specific vehicles to each component of the inter-urban bus network.

PCL has formulated plans for expansion despite the recent relatively low patronage levels. These plans include:

- new operational and maintenance facilities in Victoria;
- and the introduction of double-deck buses (e.g. 97 seats) on high capacity routes (e.g. to the B.C. Mainland).

PCL has looked at introducing new routes on the island but they believe they currently serve all areas where demand warrants scheduled inter-urban service.

2.0 BUS TRAFFIC ON THE ROADS AND FERRIES

2.1 Vehicle Traffic

Regularly scheduled bus trips represent a very small proportion of the total vehicle traffic on the Vancouver Island road network, and between the Island and Lower Mainland. The principal bus movements are on the ferry links between Victoria and Vancouver, and between Nanaimo and Vancouver. During January 1981 there were approximately 34 PCL buses per day on the Victoria-Vancouver run and 26 PCL buses per day on the Nanaimo-Vancouver run (including trips in both directions). These represent an average of 2.1 and 1.6 buses per scheduled bus departure respectively. PCL buses carried on the two ferry routes during summer months are significantly higher than these figures; Table E-1 indicates that, in 1982, scheduled levels of summer service were respectively 100% and 50% higher on the Victoria-Vancouver and Nanaimo-Vancouver services. In addition, as per the winter operations, multiple buses are assigned during the summer to each scheduled departure in response to traffic demands.

Chartered buses are also in evidence on these ferry links. Records of the B.C. Ferry Corporation for January 1981 indicate that total bus trips between Vancouver and Victoria averaged 49 per day. The PCL dispatch records for this period confirm that PCL accounted for 34 of these trips (i.e. 69%), thus it may be assumed that charter buses accounted for the remaining 15 trips, or 31%. Comparable totals on the Vancouver to Nanaimo service in January 1981 averaged 29, of which PCL accounted for 26 (90%). During the summer months, charter bus operations may be expected to increase more than scheduled services due to the general increased travel activity by residents and visitors.

In total, buses represent a relatively small fraction of the daily traffic loads on the highway and ferry systems. Table E-2 shows that only on the Swartz Bay-Tsawwassen ferry link do buses exceed 2% of the total daily traffic in the summer. On most other highway and ferry links, buses represent less than 1% of the traffic. This table includes only those locations for which recent vehicle classification counts are available; it is possible, but unlikely, that other sections of the Island road network may experience heavier bus volumes.

It should also be noted that Table E-2 includes buses other than those of PCL and OSL. In particular, in the Greater Victoria area Metro Transit buses are included in the classification counts. This partially accounts for the higher bus volumes on Highways 1, 14 and 17.

2.2 Transit Bus Passenger Traffic

As transit services were not really within the scope of the current study, very little information was collected about passenger volumes on these services. Table E-3 provides a brief record of the annual ridership on the four transit companies. No major upward or downward trends are evident in these passenger volumes

2.3 Inter-Urban Bus Passenger Traffic

Monthly passenger volumes for 1980 and 1981, are illustrated in Figure E-1 for the PCL and OSL service networks. As is evident from the graphs, passenger volumes were generally lower in 1981 than for corresponding months in 1980. This is particularly noticeable during the peak summer month (usually August). Although not illustrated in Figure E-1, monthly volumes during 1982 were also lower than 1980. For all seven route segments

TABLE E-2

BUS TRAFFIC ON THE ROAD AND FERRY NETWORKS (1980)

Road/Ferry Link	Route	Buses as % of Total[2]	Total Daily Bus Traffic[3]	Total[1] Veh Trips
54-33 Swartz Bay-Tsawwassen	Hwy 17/Ferry	2.3	144	6,200
61-32 Nanaimo-Horseshoe Bay	Hwy 1/Ferry	0.9	45	5,300
64-31 Comox-Powell River	Ferry	-	1	420
69-30 Port Hardy-Prince Rupert	Ferry	1.0	1	100
52-53 Hwy 17 (Saanich)-Sidney	Hwy 17	0.9	328	36,400
51-55 1 & 1A Corridor from Hwy 17 to 14	Hwy 1 & 1A	0.8	448	56,000
70-71 Colwood-Sooke	Hwy 14	1.1	80	7,300
55-56 Junction 1 & 14-Duncan	Hwy 1	0.5	73	14,500
58-59 Chemainus-Ladysmith	Hwy 1	0.8	100	12,500
61-62 Nanaimo-Parksville	Hwy 19	0.6	89	14,800
62-76 Parksville-Port Alberni	Hwy 4	0.5	37	7,300
63-64 Qualicum Beach-Courtenay	Hwy 19	0.5	33	6,600
64-65 Courtenay-Campbell River	Hwy 19	0.5	45	9,000
80-81 Campbell River-Gold River	Hwy 28	0.2	1	720
65-66 Campbell River-Sayward	Hwy 19	0.4	8	2,100

Notes:

[1] 1980 summer average daily traffic (all vehicles) figure taken from Ministry of Transporation and Highways' traffic count station on stated link.

[2] Percentage of bus traffic derived from Ministry classification counts (generally 1977).

[3] Vehicular flows obtained by applying percentages to 1980 SADT figures.

TABLE E-3

ANNUAL PASSENGER VOLUMES ON TRANSIT SERVICES ON VANCOUVER ISLAND

(Thousands of Passengers)

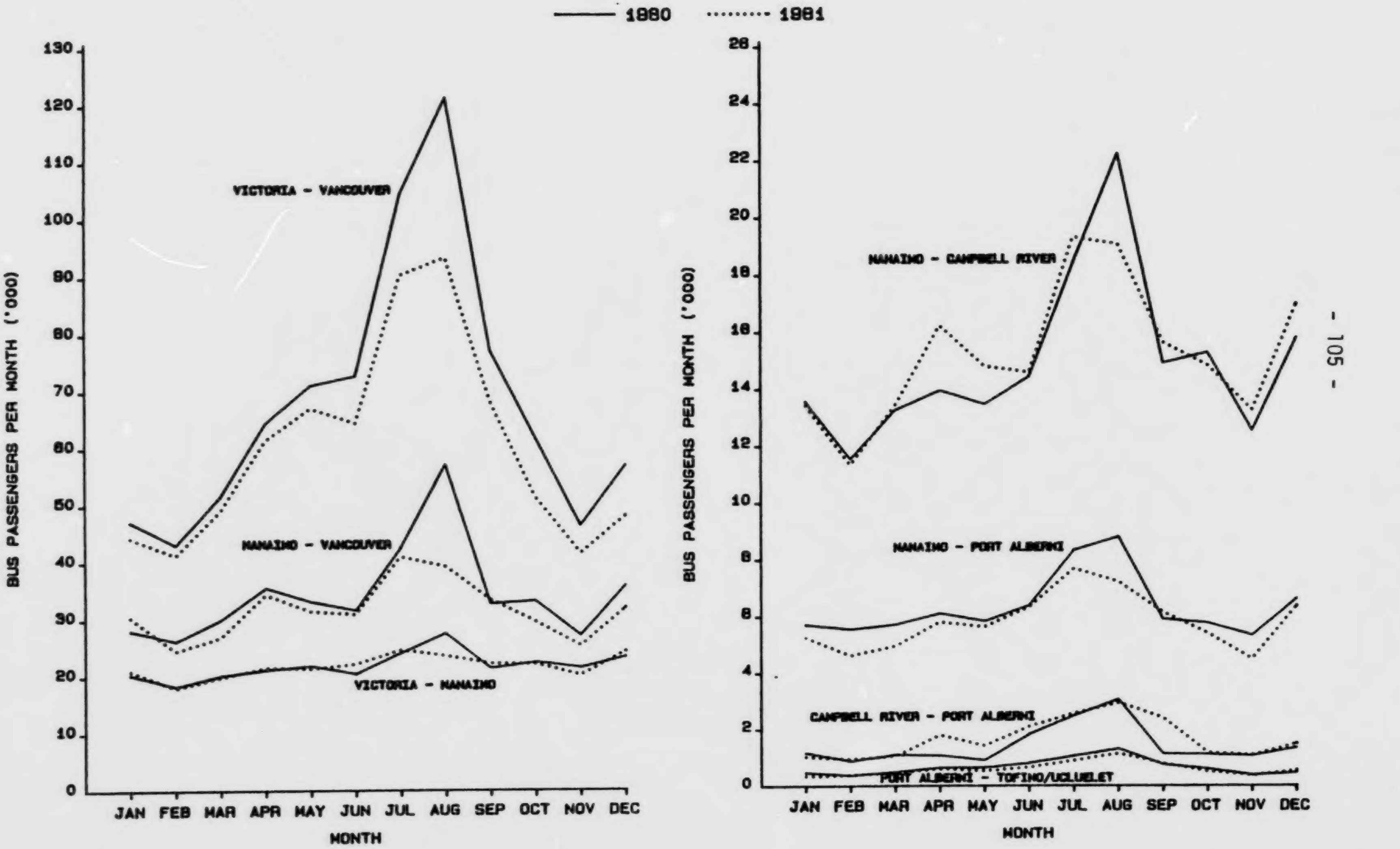
	1980	1981	1982
Greater Victoria	13,300**	15,000	14,500
Nanaimo	909	856	946
Campbell River*	-	-	200
Port Alberni	345	444	346

* commenced operation January, 1982.

** fiscal year total (April '80 - March '81).

Source: Metro Transit Operating Company, B.C. Transit

FIGURE E-1
BUS PASSENGER VOLUMES BY MONTH
(1980 & 1981)



(REFERENCE: APPENDIX E-3)

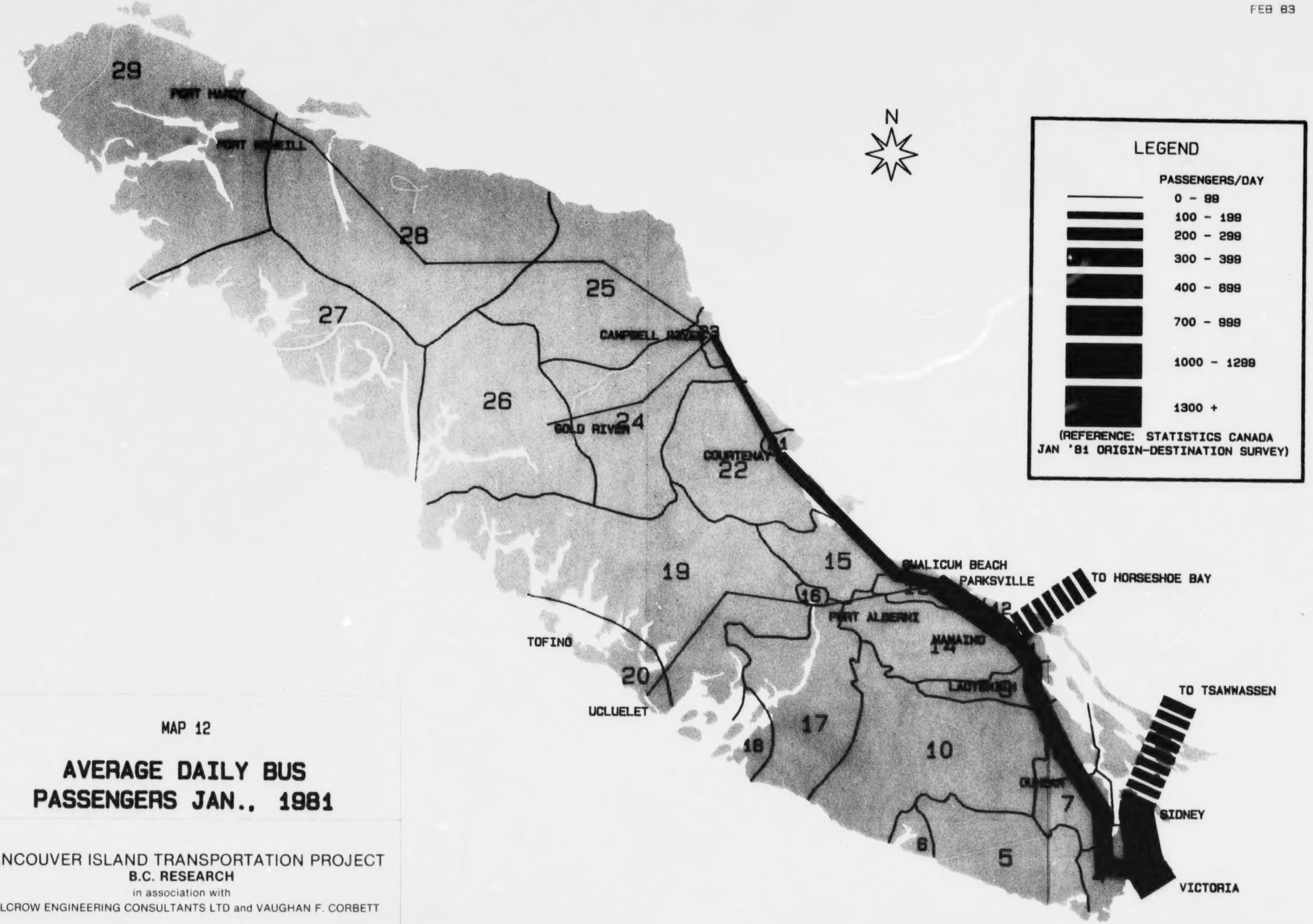
B.C. RESEARCH

shown in Figure E-1 a similar seasonal pattern emerges. There is a high summer peak, a rise in passenger volumes in December and a smaller rise in March/April. These high points reflect travel patterns during summer vacations, Christmas and Easter holidays.

Map 12 illustrates daily bus passenger movements during a week in January 1981. The heaviest traffic loads occur on the ferry links to Tsawwassen and to Horseshoe Bay. Passenger traffic north to Port Hardy, inland to Gold River, and across the Island to Tofino are insignificant by comparison.

Figures E-2 and E-3 illustrate trends in bus patronage over the period 1979 to 1982 on Vancouver Island, and to and from the Island. Average monthly passenger volumes on each component of the system are compared for each year in Figure E-2, while estimated summer average daily passenger volumes are shown in Figure E-3. Where available, statistics for years before 1979 have also been included.

The average monthly and summer average daily traffic graphs show similar trends, reflecting the significance of the July - August period in determining total bus traffic levels on Vancouver Island. PCL bus passenger volumes have generally declined since 1980, particularly on the two ferry routes. This may be partly due to the introduction of increased automobile carrying capacities of the vessels on these routes and also to the relatively low rates of increase in automobile fares on ferries compared with general rates of inflation in recent years. These factors may have made automobile use more attractive on the ferry services, thereby contributing to a decline in bus passenger volumes.

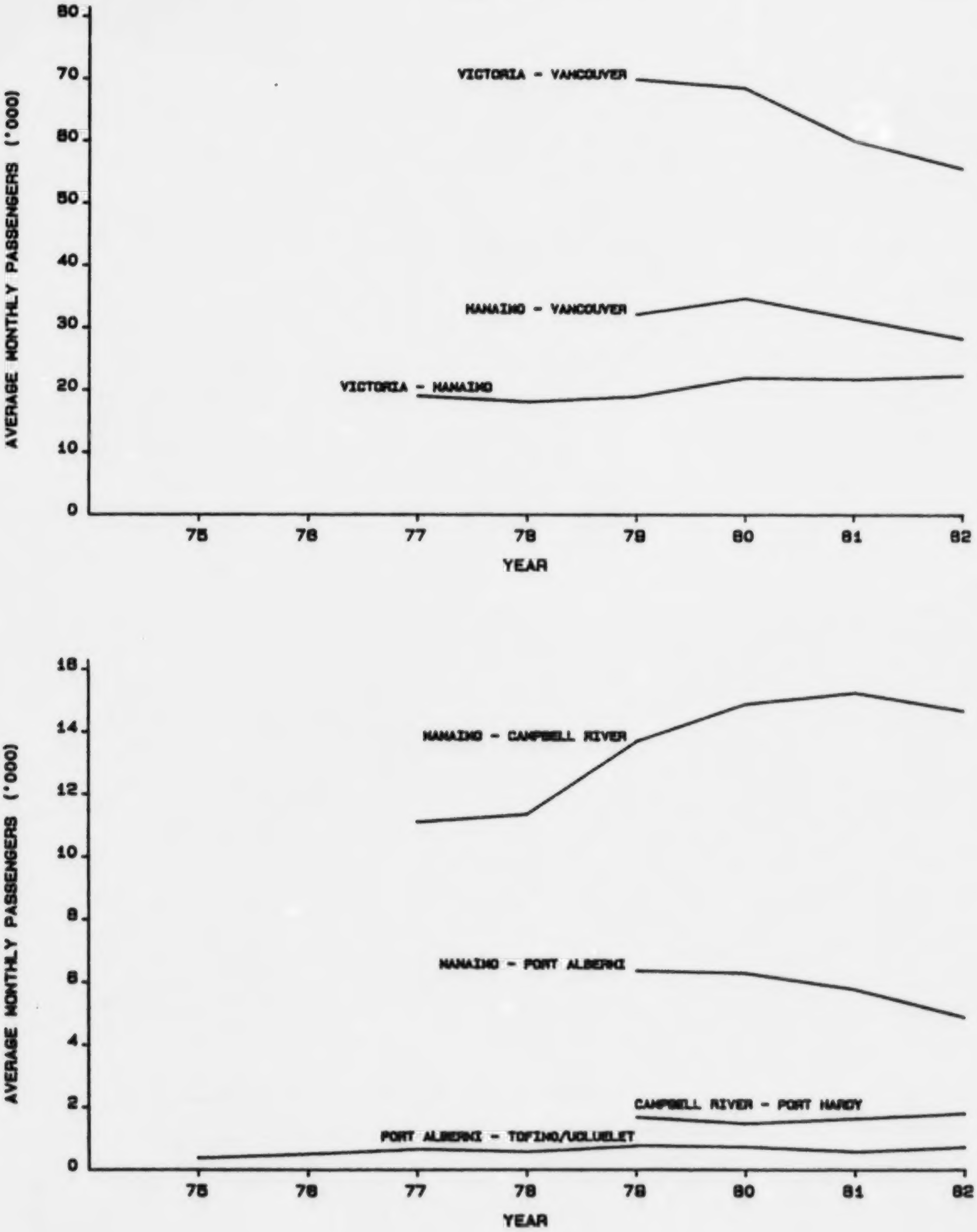

FEB 83
N
LEGEND
PASSENGERS/DAY
0 - 99
100 - 199
200 - 299
300 - 399
400 - 699
700 - 999
1000 - 1299
1300 +
(REFERENCE: STATISTICS CANADA
JAN '81 ORIGIN-DESTINATION SURVEY)
29
PORT HARDY
PORT McNEILL
28
27
25
CAMPBELL RIVER
23
26
24
GOLD RIVER
COURTENAY
22
15
19
QUALICUM BEACH
PARKSVILLE
TO HORSESHOE BAY
16
12
PORT ALBERNI
NANAIMO
14
TOFINO
20
LADYSMITH
9
UCLUELET
TO TSAWWASSEN
17
18
10
DUNCAN
7
SIDNEY
6
5
VICTORIA

MAP 12

AVERAGE DAILY BUS PASSENGERS JAN., 1981

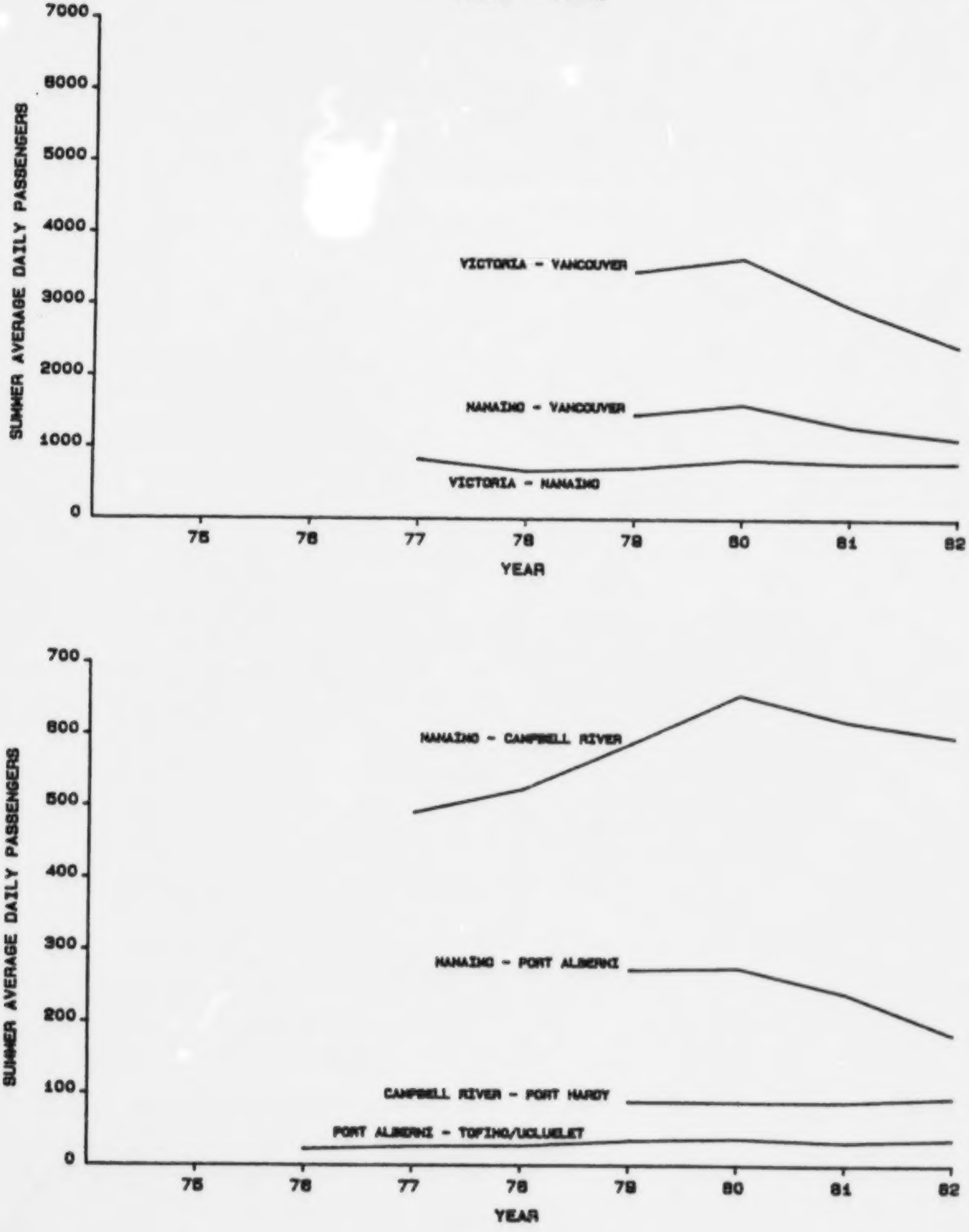
VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

FIGURE E-2
AVERAGE MONTHLY BUS PASSENGER VOLUMES
(1975 - 1982)



(REFERENCE: APPENDIX E-4)

FIGURE E-3
SUMMER AVERAGE DAILY BUS PASSENGER VOLUMES
(1975 - 1982)



(REFERENCE: APPENDIX E-6)

The decline in bus passenger traffic on the Nanaimo - Port Alberni route since 1980 reflects the impact on Port Alberni of the general decline in the activity associated with the forest industry. Other Island-based services have generally retained their patronage at or about the same levels over the last two years.

Figures E-2 and E-3 also show that on the Victoria-Nanaimo service, summer average daily traffic and average monthly patronage levels in 1978 were significantly lower than in 1977. The 1977 level of passenger volumes was not regained on this route until 1980. It is understood that the sharp 1978 decline was due, at least in part, to a substantial reduction in fares on the E & N rail service along the east coast of Vancouver Island. This reduction occurred in July 1978, and appears to have also had an effect on the Nanaimo-Campbell River passenger volumes, although not to the same dramatic extent as on the Victoria-Nanaimo service.

Concerning the two ferry routes, it was indicated earlier that passengers who board the ferries on foot (i.e. "foot passengers") are able to purchase bus tickets for PCL service from the ferry to downtown. These passengers either board a bus which is already on the ferry or, if there is insufficient capacity on board, walk off and board a PCL bus at the ferry destination terminal. PCL will send additional buses, as required by traffic demands, to meet the ferry. Table E-4 indicates that approximately 20% of the foot passengers use this PCL service to get from Swartz Bay to downtown Victoria and 18% from Departure Bay to downtown Nanaimo.

TABLE E-4

SURVEY OF FOOT PASSENGERS
ABOARD B.C. FERRIES,
SUMMER, 1982

How Arrived/ How Will Depart	Boarding Ferry At		Disembarking Ferry At	
	Swartz Bay	Departure Bay	Swartz Bay	Departure Bay
Car parked in lot	49%	36%	20%	24%
Dropped off/picked up by car	37	51	45	38
PCL bus	<1*	2*	20**	18**
Metro, transit, city bus	8	3	11	16
Other	5	8	4	4
	100%	100%	100%	100%

Source: 1982 Summer Passenger Survey,
B.C. Ferry Corporation,
Research Department, February, 1983.

* PCL does not permit passengers to ride the bus to the ferry terminal but then "walk on" the ferry. The few foot passengers who responded in this category must have misunderstood the survey question.

** Foot passengers who purchase PCL tickets while on the ferry and then disembark the ferry or leave the ferry terminal on-board PCL buses.

Table E-4 also shows that the total percentage of foot passengers using some form of bus service upon disembarking the ferry is quite significant, 31% at Swartz Bay and 34% at Departure Bay. Approximately 8% of foot passengers taking the ferry from Swartz Bay arrived at the terminal on buses other than those operated by PCL, as compared to only 3% from Departure Bay. Approximately 11% of foot passengers disembarking at Swartz Bay will use city buses, as compared to 16% at Departure Bay. To put these figures into perspective, the use of city transit services instead of PCL services represents only about 5% of the total bus passenger traffic at Swartz Bay and 8% at Departure Bay. (See Table E-5)

Table E-6 compares PCL passenger volumes on the two major ferry routes with the combined total of foot passenger and transit-oriented passengers (i.e. foot passengers plus party rate passengers). PCL carried approximately 50% of these passengers on both routes throughout 1980. During the peak summer months, PCL's share of the passenger volumes dropped to slightly below 50%. Over the past four years PCL's share of the total summer foot passenger and transit-oriented market has dropped from about the 50% level in 1979 to 40% in 1982 on both routes. During this period the number of foot passengers has been gradually increasing while the number of party-rate passengers has been decreasing.

2.4 Bus Freight Operations

Unfortunately, very little information is available about bus freight operations. PCL estimates that freight revenues constitute about 12% of their annual total revenues. For OSL, freight has more significance in terms of the total revenue for the Company; in 1980, freight revenues constituted 57% of total revenues.

TABLE E-5

ESTIMATED NUMBER OF BUS PASSENGERS TO/FROM FERRY TERMINALS

(1982 Summer Average Daily Traffic)

	Swartz Bay-Tsawwassen			Departure Bay-Horseshoe Bay		
	Foot Passengers	Bus Passengers No.	Bus Passengers %	Foot Passengers	Bus Passengers No.	Bus Passengers %
Bus Passengers:						
- PCL		2,421			1,131	
- Other		1,615			223	
Total		4,036	89.7		1,354	84.6
Foot Passengers:	2,336			1,533		
- Arriving or departing by PCL buses	10.0%	234	5.2	8.0%	123	7.7
- Arriving or departing by transit services	9.8%	229	5.1	8.0%	123	7.7
Total Number Bus Passengers To and From Ferry Terminal		4,499	100.0%		1,600	100.0%

Source: Derived from results of the 1982 Summer Passenger Survey, B.C. Ferry Corporation, Research Department, February, 1983, and from Pacific Coach Lines data.

TABLE E-6

COMPARISON OF FERRY PASSENGER/BUS PASSENGER FLOWS
BY MONTH, 1980; AND BY SUMMER AVERAGE DAILY TRAFFIC, 1979-1982

Ferry/Bus Route	Comparison	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average for Year
Victoria to Vancouver	PCL Bus Passengers Per Month as Percentage of B.C. Ferries' Foot Passengers & Party Rate Passengers* (1980)	59.8	52.8	50.7	50.7	45.5	45.6	48.9	49.5	52.8	50.6	50.8	55.1	50.3
Nanaimo to Vancouver	PCL Bus Passengers Per Month as Percentage of BC Ferries' Foot Passengers & Party Rate Passengers* (1980)	58.3	52.7	50.1	53.4	44.8	48.5	51.8	53.7	54.1	52.3	49.4	57.2	52.1

Ferry/Bus Route	Comparison Summer Average Daily Traffic	1979	1980	1981	1982
Victoria to Vancouver	PCL Bus Passengers	3,462	3,652	2,971	2,421
	B.C. Ferries'				
	Party Rate Passengers*	4,510	4,792	4,148	3,362
	Foot Passengers	2,422	2,632	2,788	2,627
	TOTAL	6,932	7,424	6,936	5,989
	PCL Bus Passengers as a % of B.C. Ferries' Party Rate and Foot Passengers	49.9%	49.2%	42.8%	40.4%
Nanaimo to Vancouver	PCL Bus Passengers	1,459	1,614	1,301	1,131
	B.C. Ferries'				
	Party Rate Passengers*	1,441	1,606	1,375	1,156
	Foot Passengers	1,282	1,444	1,605	1,781
	TOTAL	2,723	3,050	2,980	2,937
	PCL Bus Passengers as a % of B.C. Ferries' Party Rate and Foot Passengers	53.6%	52.9%	43.7%	38.5%

* Excludes those passengers who are under the age limit in the fare structure and passengers for whom there is no charge.

Source: Pacific Coach Lines, B.C. Ferries

3.0 BUS PASSENGER PROJECTIONS

It was noted earlier that PCL bus passenger volumes on the two major ferry routes have declined since 1980. It was suggested that these declines might be the result of the recent introduction of additional ferry capacities (for vehicles) on these routes and the gradual decline (relative to the costs of other services) in the cost of taking an automobile on the ferry. Whatever the cause, there appears to have been a shift away from using PCL buses on the ferry. The number of foot passengers has been increasing while the PCL volumes have been decreasing.

As the market adapts to the new vessel capacities introduced during 1981 and 1982, it is likely that a gradual return to longer ferry line-ups and increased waiting times will result. Thus, for the purposes of making bus traffic projections, it has been assumed that people will begin to shift back to using buses instead of taking their cars on the ferry.

Accordingly, it has been assumed that bus passenger traffic on the two ferry routes will return to the 1980 levels by the year 1986, and then increase at the rate of the population growth projected for the Greater Victoria and Nanaimo areas, 1.5% and 3.0% per annum respectively.

For the Victoria-Nanaimo route, bus passenger traffic has fluctuated over the past six years about an average of approximately 800 passengers per day during the summer months. Between Nanaimo and Campbell River, summer traffic has remained steady over the past four years at approximately 600 passengers per day. Similarly, summer traffic has remained fairly stable over the past four years at about 90 and 35 passengers per day between Campbell River and Port Hardy and between Port Alberni and Tofino/Ucluelet respectively. Thus, for these four routes, bus passenger volumes have been projected to increase at only one half the rate of the population increase along these routes.

The remaining route is that of Nanaimo to Port Alberni. Bus passenger traffic has declined on this route during the past four years, probably in response to reduced activity in the forest industry. Thus, for the purposes of making projections for this route, it is assumed that the 1980 level will be regained by 1986, (assuming the forest industry recovers) and that growth beyond then will be at one half the population increase projected for the Port Alberni area.

The resulting bus passenger projections are given in Table E-7. In total, these projections suggest that bus passenger volumes will grow at an average rate of 3% per annum, from the 5,300 passengers per day experienced in 1982 to approximately 9,300 passengers per day in the summer of 2001. The majority of this additional traffic is projected to be on the two ferry route services, Victoria-Vancouver and Nanaimo-Vancouver.

With the exception of the ferry route services, the projected traffic increases are not likely to pose capacity problems for the operating companies beyond adding a few more buses to their existing fleets. However, the additional passengers projected for the two ferry route services represent sizable increases over present levels. Expansion of both fleet and terminal facilities, plans such as those currently being considered by PCL, may well be required in order to accommodate this future demand.

TABLE E-7

BUS PASSENGER PROJECTIONS

(Summer Average Daily Traffic)

Bus Route	Actual 1982	Growth Rate	Projected 1986	1991	1996	2001
Victoria - Nanaimo	802	0.9%	840	870	910	960
Nanaimo - Campbell River	597	1.5	650	700	750	810
Campbell River - Port Hardy	95	1.6	100	110	120	130
Nanaimo - Port Alberni	240*	1.2	270	290	300	320
Port Alberni - Ucluelet/Tofino	37	0.6	40	40	40	40
Victoria - Vancouver	2,421	1.5	3,650	3,930	4,240	4,560
Nanaimo - Vancouver	1,131	3.0	1,610	1,860	2,160	2,500
Total	5,323	3.0%	7,160	7,800	8,520	9,320

* 1981 value

4.0 COMMERCIAL TRUCK TRAFFIC ON THE ROADS AND FERRIES

Like buses, commercial trucks comprise only a relatively small proportion of the vehicle traffic on the Vancouver Island road network. Table E-8 indicates the volume of truck traffic on the various road links, based on an analysis of the Ministry of Transportation and Highways' 1980 traffic counts and vehicle classification records, and on B.C. Ferry traffic statistics. On a percentage basis, truck trips vary from a minimum of 1.1% of total vehicle traffic on the Parksville - Port Alberni and the Junction 1 & 14 (Colwood) - Sooke sections of highway, to a maximum of 12.8% on the Campbell River - Gold River route. These percentages represent 80, 80 and 92 truck trips per day respectively. The highest recorded number of truck trips per day (1,456) during the summer in 1980 was observed in the Highway 1 & 1A corridor between Highway 17 (Victoria) and Highway 14 (Colwood). It should be noted, however, that this analysis was limited to a comparison of only those locations for which vehicle classification data were available. It is possible that other sections of the Island's highway network experience relatively heavier volumes of truck traffic.

While the actual volume of trucks on the highways is small relative to automobile traffic, it is important to remember that each truck has an impact on roadway capacity of much more than one car. Depending on road characteristics, (e.g. sharp turns, steep hills, and traffic signals) trucks are considered to represent from 3 to 25 car equivalents, with 10 being the normal figure used. Thus, on the Campbell River - Gold River route cited above, the 92 daily truck trips may be considered to correspond to 920 car equivalents per day. This represents more than the traffic loading due to automobiles on this link.

TABLE E-8

TRUCK TRAFFIC ON THE ROAD AND FERRY NETWORKS (1980)

Road/Ferry Link	Route	Trucks as % of Total[2]	Total Daily Truck Traffic[3]	Total[1] Veh Trips
54-33 Swartz Bay-Tsawwassen	Hwy 17/Ferry	3.4	209	6,200
61-32 Nanaimo-Horseshoe Bay	Hwy 1/Ferry	3.9	207	5,300
64-31 Comox-Powell River	Ferry	3.1	13	420
69-30 Port Hardy-Prince Rupert	Ferry	2.0	2	100
52-53 Hwy. 17 (Saanich)-Sidney	Hwy 17	1.7	619	36,400
51-55 1 & 1A Corridor from Hwy 17 to 14	Hwy 1 & 1A	2.6	1,456	56,000
70-71 Colwood-Sooke	Hwy 14	1.1	80	7,300
55-56 Junction 1 & 14-Duncan	Hwy 1	4.0	580	14,500
58-59 Chemainus-Ladysmith	Hwy 1	1.5	188	12,500
61-62 Nanaimo-Parksville	Hwy 19	2.1	310	14,800
62-76 Parksville-Port Alberni	Hwy 4	1.1	80	7,300
63-64 Qualicum Beach-Courtenay	Hwy 19	1.7	112	6,600
64-65 Courtenay-Campbell River	Hwy 19	4.4	396	9,000
80-81 Campbell River-Gold River	Hwy 28	12.8	92	720
65-66 Campbell River-Sayward	Hwy 19	3.2	67	2,100

Notes:

[1] 1980 summer average daily traffic (all vehicles) figure taken from Ministry of Transportation and Highways' traffic count station on stated link.

[2] Percentage of truck traffic derived from Ministry classification counts (generally 1977).

[3] Vehicular flows obtained by applying percentages to 1980 SADT figures.

As no data were available to indicate the origins and destinations of commercial truck traffic, a telephone survey was conducted of all major trucking organizations serving Vancouver Island. The purpose of the survey was to determine the volume, frequency and general routing of trucks operated by each firm. Several comments were received from these trucking companies concerning their operating problems. These comments have been summarized in Appendix E-7. For on-Island travel, the check points on the highway network given in Table E-8 served as control totals, while statistics from C.P. Marine, C.N. Rail and B.C. Ferries provided similar checks on trucks entering and leaving the Island.

4.1 C.P. Marine

C.P. Marine provides a regular, scheduled "drop trailer" ferry service to and from Vancouver Island, moving trailers between Vancouver and Swartz Bay and between Vancouver and Nanaimo. Trailers may be "dropped" at the C.P. Marine ferry terminal and truck cabs need not wait for the ferry's arrival. C.P. Marine moves the trailers on and off the ferries for the trucking firms. These two routes carried an annual average of 100 and 160 trailers per day respectively in 1980 (total movements, both directions).

The telephone survey of major shippers using the C.P. Marine services provided the data shown in Table E-9. Nearly all of the trailers on the Vancouver - Swartz Bay route were bound for the Victoria area. Only 6% were destined beyond Victoria, and then only as far up-Island as Duncan. On the Vancouver - Nanaimo route there was a much greater dispersion of trucks to various Island locations. Approximately 40% of the trailers stayed in the immediate Nanaimo area, 20% moved west across the Island to points like Port Alberni, Gold River and Tofino, while

TABLE E-9

TRUCK/TRAILER MOVEMENTS VIA C.P. MARINE, 1980

Route	No. of Trailer Movements/Day (round trips) 1980	Origin	Destination	Commodity Carried (Outbound)[1]
Vancouver-Swartz Bay	50	Vancouver	Victoria	Consumer-related (incl. food)
	44	Vancouver	Victoria	General freight
	2	Vancouver	Duncan	Consumer-related
	2	Vancouver	Colwood	Consumer-related
	2	Vancouver	Sooke	Consumer-related
	100			
Vancouver-Nanaimo	12	Vancouver	Nanaimo	Consumer-related (incl. food)
	52	Vancouver	Nanaimo	General freight
	2	Vancouver	Port Alberni	Consumer-related
	2	Vancouver	Port Alberni	General freight
	26	Vancouver	Pt. Alberni/ Tofino/Ucluelet	General freight
	2	Vancouver	Campbell River	Consumer-related
	12	Vancouver	Campbell River	General freight
	4	Vancouver	Courtenay	Consumer-related
	10	Vancouver	Courtenay	General freight
	4	Vancouver	Port Hardy	General freight
	2	Vancouver	Gold River	Forest products
	2	Vancouver	Duncan/Ladysmith	Consumer-related
	30	Vancouver	Points north of Nanaimo	N/A
	160			

Notes:

[1] All return trips generally empty, with trailers double-decked.

Source: Telephone survey, December 1982.

the remaining 40% headed further north to Courtenay, Campbell River and Port Hardy.

Major shipping companies who used the C.P. Marine service to Vancouver Island on a regular basis in 1980 were:

- Public Freightways Ltd. (The Johnston Group), Vancouver B.C.;
- C.P. Transport, Vancouver, B.C.;
- Safeways, Burnaby, B.C.;
- Capital Freightways, Vancouver, B.C.;
- Sidney Freight, Sidney, B.C.;
- Haida Freightways, Campbell River, B.C.;
- Doman Industries, Vancouver, B.C.

4.2 C.N. Rail

C.N. Rail provides a similar "drop trailer" service (although much smaller) between Tilbury Island (Vancouver) and Ogden Point (Victoria). During 1980 this barge service carried an average of 5 trailers per day and by 1982 this had increased to an average of 11 per day. According to C.N. Rail, 97% of the in-bound traffic terminates within a very short distance (i.e. less than 8 km.) of downtown Victoria and the remaining 3% moves northward to various points "up Island".

4.3 Automobile Ferries

The B.C. Ferry Corporation, as indicated in the previous chapter, provides regular, scheduled ferry service at a number of locations on Vancouver Island. Three of their ferry routes operate between Vancouver Island and the B.C. Mainland: Swartz Bay-Tsawwassen; Nanaimo-Horseshoe Bay; and Port Hardy-Prince Rupert. The Ministry of Transportation and Highways operates the service between Comox and Powell River on the B.C. Mainland. The average daily truck traffic in 1980 on these four routes was 209, 207, 2 and 13 trucks respectively.

A telephone survey was conducted of the "high volume", regular, commercial users of the two main ferry routes identified by the B.C. Ferry Corporation. Unfortunately, this survey produced truck trip information accounting for only 10% of the daily truck traffic on the main B.C. Ferry routes, and yielded no data on trucks using the Comox - Powell River and the Port Hardy - Prince Rupert ferry services. The implication from this is that the two main ferry routes are used more irregularly, and by a larger number of trucking companies, than are the C.P. Marine services.

As an alternative to the interviewing technique, information was used from the 1979 Commercial Truck Survey of the two main B.C. Ferry Corporation routes carried out by B.C. Research over a 6-day period in September, 1979. This survey resulted in an origin - destination tabulation of truck movements between the Lower Mainland (and other parts of B.C.) and four Vancouver Island regions: namely Gulf Islands, South Vancouver Island, Central Vancouver Island, and North Vancouver Island. This survey data, when factored up to represent 1980 average summer daily traffic, provided control totals and the basis for the origin-destination data needed in this study.

The information obtained from the 1979 Truck Survey was further refined to be compatible with the 29 Island zones used in the current project by distributing the regional truck trip data in proportion to business and industry employment levels in the

Island zones. Unfortunately, the employment data which was available at a sufficiently detailed level so that it could be allocated to individual geographic zones, excluded Government employment. However, these data were used regardless. Thus, in each region, the zone with the highest number of people employed in the private sector was assigned the highest number of commercial truck trips to and from that region. The resulting matrix of truck movements was then assumed to represent the distribution of truck traffic using the two main ferry routes. Unfortunately, this technique was still unable to provide information on the small number of truck movements on the Comox - Powell River and Port Hardy - Prince Rupert routes.

Table E-10 presents estimates of the off-Island truck/trailer movements using C.P. Marine, C.N. Rail, and B.C. Ferries in 1980. These are broken down by Island zone. Zones which generated the highest number of truck movements are Victoria, Nanaimo, Port Alberni and, to a lesser extent, Campbell River, Courtenay, Tofino/Ucluelet and Duncan.

4.4 Forest Product Trucks

The forest products industry on Vancouver Island contributes a significant volume of truck traffic throughout the Island, using both the public road network and, more usually, the network of private logging roads. While some of this traffic will use the ferry and barge services described above, much of it never leaves the Island. These trucks transport logs from Island logging camps to Island mills for processing and transport finished wood products from mill to dockside for transfer to ship or barge.

TABLE E-10

TRUCK/TRAILER MOVEMENT VIA C.P. MARINE, C.N. RAIL, AND B.C. FERRIES, 1980

(Number of Trailer Movements/Day)

	Zone Destination	C.P. Marine Terminal		B.C. Ferries Terminal		C.N. Rail
		Swartz Bay	Nanaimo	Swartz Bay	Nanaimo	Victoria
1	Victoria	94		148	6	5
2	Saanich			4		
3	North Saanich			11		
4	Colwood	2				
5	Sooke	2		2		
7	Shawnigan			1		
8	Duncan	2	2	25	1	
9	Ladysmith				3	
10	Lake Cowichan			9	1	
12	Nanaimo		64	2	56	
13	Parksville				6	
15	Qualicum Beach				3	
16	Port Alberni		26	2	56	
17	Nitinat				3	
20	Tofino/Ucluelet		4			
21	Courtenay		20	1	13	
23	Campbell River		22	1	20	
25	Sayward		1		3	
26	Gold River		5	1	8	
27	Tahsis		6	1	13	
28	Port McNeill		2		5	
29	Port Hardy		8	1	10	
	TOTAL	100	160	209	207	5

Source: CP Marine & CN Rail data from a Telephone Survey of high volume users conducted in December, 1982. B.C. Ferries data derived from 1979 Commercial Truck Survey conducted by B.C. Research on behalf of the B.C. Ferry Corporation.

To obtain information about this traffic, a telephone survey was conducted of all lumber, pulp and plywood mills on Vancouver Island. The purpose of the survey was to determine travel details of trucks serving the mills. For each mill, an estimate of the average weekly flow of trucks into and out of the mill was established, together with the origin and destination of these trucks. The results of this survey are shown in Table E-11.

Unfortunately, it was not possible to obtain truck data from every mill. The first column of Table E-11 provides an estimate of the percentage of forest product truck movements per week in each zone which were covered by the survey. As can be seen, there was excellent coverage in most zones but almost no coverage in the Victoria, Campbell River and Gold River zones.

For the zones where data were available, a breakdown by specific zone of origin or destination was usually obtained. However the more general description of "various locations" had to be assigned to some of the truck movements, in part because of the low frequency or sporadic nature of these trips. Only 312 (7%) of the 2,973 truck movements per week recorded in Table E-11 involved trips off Vancouver Island. Most of the trips are associated with major mill or seaport locations.

4.5 Other Island-Based Truck Traffic

If all truck traffic on Vancouver Island was either associated directly with the forest industry or was a user of one of the ferry or barge services, then the preceeding four sections of this chapter would have accounted for all of the truck traffic on the Island road network. However, not all trucks fall into one of these two categories. The remaining traffic is referred to here as "other" Island-based truck traffic.

TABLE E-11

FOREST PRODUCTS TRUCK TRAFFIC ON VANCOUVER ISLAND

(Number of Trucks/Week, 1980)

	% Est. Complete	Nanaimo Ferry	Various Loc'ns	1 Vict-oria	5 Sooke	8 Duncan/ Chemain. N. Cow.	9 Lady-Smith	10 Lake Cow. Youbou	12 Nanaimo	13 Parks-ville	15 Quali-cum Beach	16 Port Alberni	21 Court-enay/ Comox	23 Camp-bell River	Total
1 Victoria	1%					50									50
5 Sooke	100			113	15										128
8 Duncan/Chemainus/ North Cowichan	100	46	41	102		262	104	320	127			6			1,008
9 Ladysmith	100	4	1			95			252						352
10 Lake Cowichan/ Youbou	100	32	20	35		130									217
12 Nanaimo	100	44	15			138	250		580			3			1,030
16 Port Alberni	100	65	6	13		5			7	1	1	1	1		100
21 Courtenay/Comox	100								23					40	63
23 Campbell River	16	12	1												13
26 Gold River	0														0
27 Tahsis/Zeballos	100	2													2
29 Port Hardy/ Port Alice	100%	8		2											10
Total		213	84	265	15	680	354	320	989	1	1	10	1	40	2,973

Source: Telephone survey of Forest Product Mills, December 1982.

To estimate the volume of this "other" truck traffic, the origin-destination truck movements in Tables E-10 and E-11 were assigned to all appropriate highway links. Resulting truck volumes were then subtracted from the Ministry of Transportation and Highways' vehicle classification counts in Table E-8. The outcome from this process is provided in Table E-12. If the data were completely accurate, then the final column in this table would represent truck traffic between various points on Vancouver Island (i.e. traffic not originating from nor destined to off-Island locations) and which is not associated with the forest product industry. This "other" truck traffic would correspond to general commodity movements between communities on Vancouver Island. Unfortunately, incomplete truck data for ferry users and for trucks associated with the forest industry means that this final column must be viewed simply as a rough estimate of the "other" truck traffic on Island highways. None-the-less it still provides a general picture of a sizeable volume of truck traffic.

The biggest 'shortfall' between simulated and actual truck trips occurs on Highway 1 between Victoria and Nanaimo, indicating that there is considerable local activity by trucks in this corridor. North of Nanaimo the simulated volumes are also generally lower than actual truck counts, again indicating the prevalence of trucks making Island-based trips.

TABLE E-12

TRUCK TRAFFIC BY SERVICE TYPE ON THE ROAD NETWORK, 1980

	Highway Link	Total Estimated Trucks[1] ADT, 1980	Estimated Truck Volumes, ADT 1980 Island-Based Trips			
			Via CP Marine & CN Rail	Via B.C. Ferries	Mill Traffic[2]	Other[3]
50-51	Victoria - Junction Hwy. 17 and 1	3,858	99	154	45	3,560
51-52	Junction Hwy. 17 & 1 - Saanich	2,619	100	198	0	2,321
51-55	1 & 1A Corridor from Hwy 17 to 14	1,456	6	52	45	1,353
52-53	Saanich - Sidney	619	100	209	0	310
53-54	Sidney - Swartz Bay	185	100	209	0	-124
55-56	Junction Hwy. 14 & 1 - Goldstream Park	580	2	50	29	499
55-70	Junction Hwy. 14 & 1 - Colwood	372	4	2	16	350
56-57	Goldstream Park - Malahat	560	2	50	29	479
57-58	Malahat - Junction Hwy. 1 & 18	364	4	50	198	112
58-59	Junction Hwy. 1 & 18 - Ladysmith	188	2	20	70	96
58-73	Junction Hwy. 1 & 18 - Lake Cowichan	46	0	13	69	-36
59-60	Ladysmith - Cassidy	214	2	23	113	76
60-61	Cassidy - Nanaimo	289	2	23	113	151
60-75	Cassidy - Nanaimo (Rural)	25	0	0	0	25
61-62	Nanaimo - Parksville	310	94	134	5	77
62-63	Parksville - Qualicum Beach	255	64	80	4	107
62-76	Parksville - Port Alberni	80	30	58	9	-17
63-64	Qualicum Beach - Courtenay	112	64	77	4	-33
64-65	Courtenay - Campbell River	396	44	63	6	283
65-66	Campbell River - Hwy. 19 (Sayward)	67	11	19	1	36
65-80	Campbell River - Hwy. 28 (Strathcona Rural)	240	11	23	0	206
66-67	Hwy. 19 (Sayward) - Woss	80	10	16	1	53
67-68	Woss - Port McNeill	60	10	16	1	33
67-81	Woss - Gold River	2	0	0	0	2
68-69	Port McNeill - Port Hardy	45	8	11	1	25
70-71	Colwood - Sooke	80	2	2	16	60
71-72	Sooke - Port Renfrew	18	0	0	0	18
73-74	Lake Cowichan - Bamfield	8	0	3	0	5
74-77	Bamfield - Nitinat	7	0	0	0	7
76-77	Port Alberni - Nitinat	9	0	0	0	9
76-78	Port Alberni - Hwy. 4 (Effingham)	17	4	0	0	13
78-79	Hwy. 4 (Effingham) - Hwy. 4 fork to Tofino/Ucluelet	17	4	0	0	13
80-81	Hwy. 28 (Strathcona Rural) - Gold River	92	11	23	0	58
81-82	Gold River - Tahsis	28	6	14	0	8

Notes:
[1] Estimated from SADT Volumes, 1980.
[2] Mill traffic not destined for a ferry terminal.
[3] 'Other' = Total Estimated Trucks - (C.P. Marine + B.C. Ferries + Mill Traffic).

SADT = Summer Average Daily Traffic.
ADT = Average Daily Traffic.

5.0 COMMERCIAL TRUCK PROJECTIONS

Due to the difficulty in collecting comprehensive and accurate data on historical truck traffic, it was not possible to make truck projections on the basis of an origin-destination matrix for that traffic. Instead, truck projections to the year 2001 had to be prepared on a link-by-link basis.

From Tables E-11 and E-12, it is evident that on many of the highway links a significant proportion of the truck traffic is related to the forest industry. Since the future outlook for the forest industry on Vancouver Island is one of no growth beyond 1980 industry levels, it seemed appropriate to apply this same assumption to truck traffic related to the forest industry. Therefore, for the purposes of making projections, it was assumed that forest product truck traffic levels in the year 2001 would remain the same as the 1980 levels.

For other components of truck traffic on the highways, it was assumed that growth would be at the same rate as the automobile traffic growth on each link (see Table C-10). The only exceptions to this general procedure involve two Highway links in the Campbell River area. The Quinsam Coal Limited project on Vancouver Island was recently approved at the Stage II level by the Environment and Land Use Committee. Since this project has progressed successfully this far, it appears reasonable to assume that it will continue, at least in some modified form, to the production stage. According to current plans, the haul schedule calls for 140 trucks per day to enter Highway 28 at the junction of the access road to the proposed Quinsam Coal mine and along Highway 19 to the access road of the new Middle Bay barge loading facilities a few kilometers north of Campbell River. This additional truck traffic has been added to that traffic projected according to the general assumptions referred to above, on the two highway links 65-66 Campbell River - Hwy. 19 (Sayward) and 65-80 Campbell River - Hwy. 28 (Strathcona Rural). The resulting growth rate assumptions and the projected truck traffic on each link are shown in Table E-13.

Highway links for which the projected truck traffic volumes (from Table E-13) are in excess of 5% and in excess of 10% of the projected automobile traffic for the year 2001 (from Table C-10) are listed below. Those links which were identified as having potential congestion problems due to automobile volumes alone are noted with an asterisk. The truck traffic will certainly add to the seriousness of the potential congestion on these routes.

Truck Traffic is More Than 10% of Projected Auto Traffic

65-80 Campbell River - Hwy. 28 (Strathcona Rural)
67-81 Woss - Gold River
73-74 Lake Cowichan - Bamfield
74-77 Bamfield - Nitinat
80-81 Hwy. 28 (Strathcona Rural) - Gold River
81-82 Gold River - Tahsis

Truck Traffic is More Than 5% of Projected Auto Traffic

55-56* Junction Hwy. 14 & 1 - Goldstream Park
60-75 Cassidy - Nanaimo (Rural)
64-65* Courtenay - Campbell River
65-66 Campbell River - Hwy. 19 (Sayward)
66-67 Hwy. 19 (Sayward) - Woss
71-72 Sooke - Port Renfrew

TABLE E-13

PROJECTED TRUCK TRAFFIC IN 2001 ON MAJOR HIGHWAY LINKS

(Average Daily Traffic)

Highway Link		Total Estimated[1] Trucks ADT 1980	Growth Rate	Projected Truck Traffic ADT 2001
50-51	Victoria - Junction Hwy. 17 and 1	3,858	1.1%	4,850
51-52	Junction Hwy. 17 & 1 - Saanich	2,619	1.1	3,300
51-55	1 & 1A Corridor from Hwy. 17 to 14	1,456	1.9	2,160
52-53	Saanich - Sidney	619	2.0	940
53-54	Sidney - Swartz Bay	185	2.5	310
55-56	Junction Hwy. 14 & 1 - Goldstream Park	580	2.0	880
55-70	Junction Hwy. 14 & 1 - Colwood	372	1.9	550
56-57	Goldstream Park - Malahat	560	1.9	830
57-58	Malahat - Junction Hwy. 1 & 18	364	0.8	430
58-59	Junction Hwy. 1 & 18 - Ladysmith	188	0.6	210
58-73	Junction Hwy. 1 & 18 - Lake Cowichan	46	0.0	46
59-60	Ladysmith - Cassidy	214	0.3	230
60-61	Cassidy - Nanaimo	289	1.0	360
60-75	Cassidy - Nanaimo (Rural)	25	2.8	45
61-62	Nanaimo - Parksville	310	2.1	480
62-63	Parksville - Qualicum Beach	255	2.7	450
62-76	Parksville - Port Alberni	80	0.1	80
63-64	Qualicum Beach - Courtenay	112	2.3	180
64-65	Courtenay - Campbell River	396	2.9	720
65-66	Campbell River - Hwy. 19 (Sayward)	67	6.7	262
65-80	Campbell River - Hwy. 28 (Strathcona Rural)	240	4.5	600
66-67	Hwy. 19 (Sayward) - Woss	80	2.8	140
67-68	Woss - Port McNeill	60	2.7	105
67-81	Woss - Gold River	2	3.4	4
68-69	Port McNeill - Port Hardy	45	2.6	77
70-71	Colwood - Sooke	80	2.1	120
71-72	Sooke - Port Renfrew	18	2.6	31
73-74	Lake Cowichan - Bamfield	8	1.8	12
74-77	Bamfield - Nitinat	7	2.5	12
76-77	Port Alberni - Nitinat	9	1.8	13
76-78	Port Alberni - Hwy. 4 (Effingham)	17	1.8	25
78-79	Hwy. 4 (Effingham) - Hwy. 4 fork to Tofino/Ucluelet	17	1.7	24
80-81	Hwy. 28 (Strathcona Rural) - Gold River	92	2.8	160
81-82	Gold River - Tahsis	28	2.5%	47

Notes:

[1] Estimated from Summer Average Daily Traffic Volumes, 1980.
ADT = Average Daily Traffic.

6.0 SUMMARY

6.1 Bus Services

Inter-urban bus services on Vancouver Island are provided by Pacific Coach Lines Ltd. and Orient Stage Lines Ltd. Most communities with a 1981 population in excess of 1,500 persons are either directly served by one of these two companies or are near main routes, with bus service to transfer points provided by local transit services. Lake Cowichan, Youbou, Thasis and Port Alice appear to be the only exceptions and bus service demands in these communities may not be sufficient to warrant scheduled inter-urban services.

PCL bus services are generally demand responsive, with additional vehicles being readily added to scheduled departures if traffic warrants increased capacities. On the major bus-ferry routes between Vancouver Island and the B.C. Lower Mainland, additional buses will be dispatched to meet the arriving ferries in order to accommodate foot passengers on board the ferry who wish bus transportation.

PCL passenger volumes on the two major ferry routes represented approximately 50% of the combined total of foot passengers and party-rate passengers on board the ferries in 1980. This percentage has been declining, however. By 1982, it had dropped to the 40% level on both routes. The number of foot passengers has been increasing while the number of PCL bus passengers on these routes has declined. PCL bus passenger traffic between Nanaimo and Port Alberni has also declined, presumably due to reduced economic activity in the forest industry at Port Alberni. On other inter-urban bus routes (including both PCL and OSL), passenger volumes have either fluctuated about an average value or remained fairly constant during the 1979 to 1982 period.

Bus passenger projections prepared during this study suggest that passenger volumes will grow at an average rate of 3% per annum, from the 5,300 passengers per day recorded in the summer of 1980 to approximately 9,300 passengers per day in summer 2001. Most of this increase is expected to occur on the two ferry routes and will likely require expansion of both bus fleet and bus terminal facilities serving these two routes in order to be accommodated.

6.2 Commercial Trucks

Commercial trucks, like buses, comprise a relatively small proportion of the vehicle traffic on the Vancouver Island road network. On a percentage basis, truck trips usually represent between 1% and 4% of total vehicle traffic, depending on the particular highway link. While the actual volume of trucks is small relative to automobile traffic, each truck has an impact on road capacity of much more than one car. The figure frequently is 10 car equivalents. Thus, small volumes of truck traffic can cause significant congestion problems.

Highway links in the Victoria area have the highest incidence of truck traffic, approximately 600 to 1,400 trucks per day. Along the main Island highway between Victoria and Campbell River, the truck volumes are typically in the range of 100 to 500 trucks per day.

Special "drop trailer" ferry services between Vancouver Island and the Lower Mainland are provided by both C.P. Marine and C.N. Rail. Roll-on/roll-off ferry services are provided by B.C. Ferries (to the Lower Mainland and to Prince Rupert) and by the Ministry of Transportation and Highways (to Powell River). In total, these ferry services carry an estimated 680 trucks or truck trailers per day.

A substantial proportion of the truck traffic on the Vancouver Island highway system is associated with the forest products industry. These trucks are primarily travelling between Island logging camps and Island mills or between Island mills and Island dock facilities. Less than 10% of the truck trips related to the forest industry are destined for the ferry services.

However, in addition to the truck trips destined for off-Island locations and those associated with the forest industry, the majority of truck traffic must be considered as local activity, particularly in the Victoria area and along the Victoria to Nanaimo corridor.

Projections of truck traffic levels prepared during the current study identified several links for which the anticipated number of trucks on the highways in the year 2001 will exceed 10% of the projected automobile traffic for these same links.

F. RAIL

F. RAIL

1.0 RAIL FACILITIES

Vancouver Island has only a small number of rail facilities and portions of these are threatened with abandonment. Four separate lines serve the Island: two private logging railways and two lines which provide service to the general public. These lines are illustrated in Map 13.

At the northern end of Vancouver Island, Canadian Forest Products Limited owns and operates a private logging railway. This line stretches from Beaver Cove, on the eastern shoreline, inland to the logging camps near Woss Lake and Schoen Lake. Near the southern end of the Island, Crown Zellerbach Limited operates a logging railway from its logging camps in the Nanaimo Lakes area eastward to the coast line near Ladysmith. As these two railways operate strictly as private logging railways, they were considered outside the terms of reference of the current study. No attempt was made to collect facility or traffic data on these two lines.

The two public railways are situated near the southern end of the Island. These are the Canadian National Railway (CNR) and the Esquimalt and Nanaimo Railway (E & N), which is owned and operated by the Canadian Pacific Railway (CPR). Both lines provide services on Vancouver Island and offer connecting services with the Mainland through rail-barge facilities.

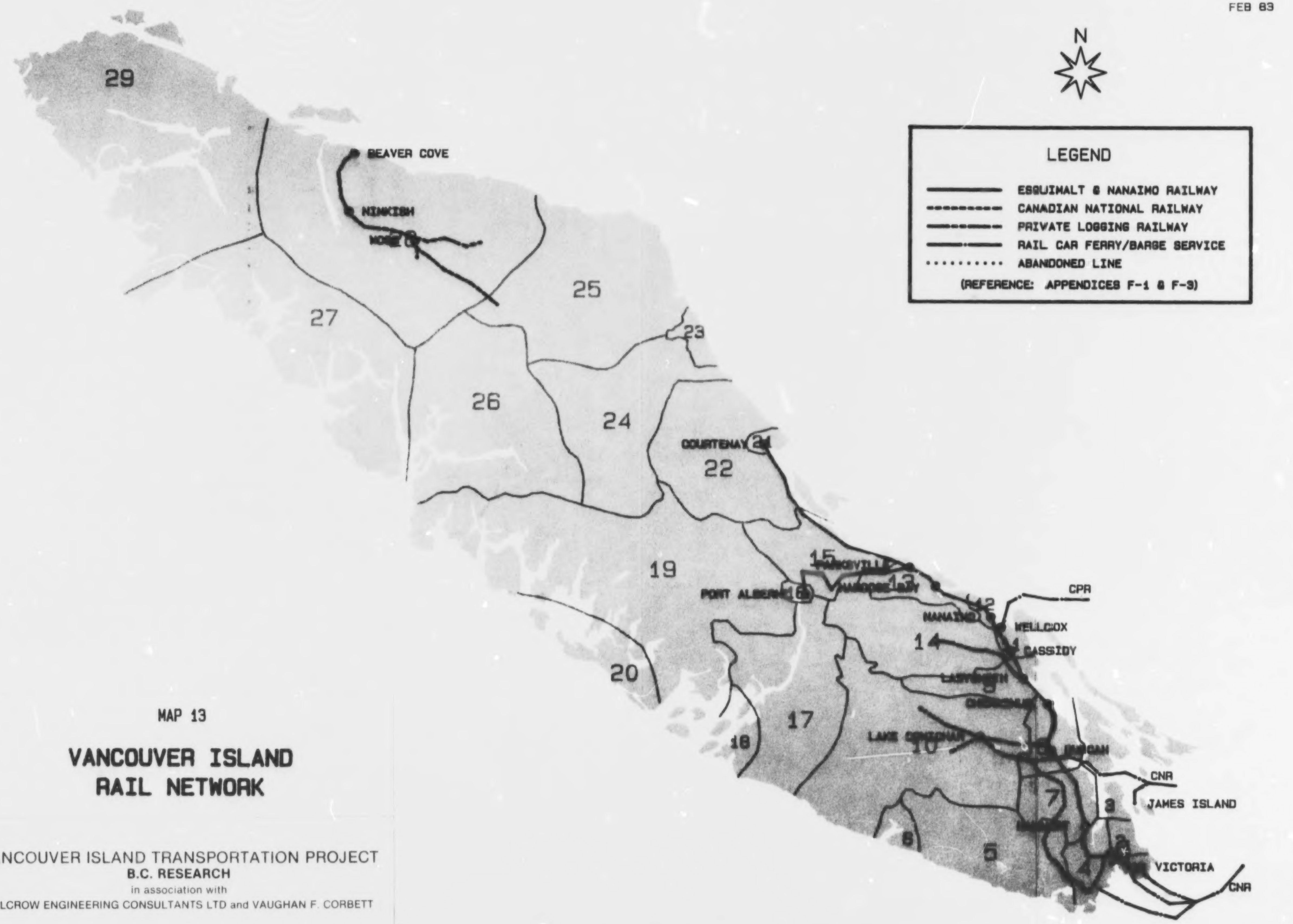
1.1 E & N Railway

Freight services are provided by the Canadian Pacific Railway on what is known as the E & N Railway. VIA Rail operates passenger services on the main line component of this railway, between

Victoria and Courtenay. While originally built in 1886 between Esquimalt and Nanaimo (from which the line received its name), the line was immediately extended to Victoria in the south and Wellington in the north. In 1905 the line was acquired by the CPR, together with land grants. Over the ensuing seven years the main line was extended north to Courtenay and ancillary lines were built from Parksville westward to Port Alberni, and from Hayward (near Duncan) westward to Lake Cowichan. In 1923, the Pacific Logging Railway laid 40 km. of track westward beyond Lake Cowichan for log traffic. The E & N eventually acquired this line; today only 11 km remain in operation.

Map 14 illustrates the E & N line in greater detail, showing stations and flag stops along the route. The Victoria to Courtenay subdivision of the E & N Railway line traverses some 224 km. along the east coast of Vancouver Island. The track generally follows the ocean shore, except for the southern portion of the line where it crosses mountainous terrain through the Malahat Pass. The line passes through two tunnels and spans numerous deep ravines and swift rivers, with a total of 53 trestles varying in length from 5 meters to the 319 meter bridge over French Creek, 5.6 km. north of Parksville.

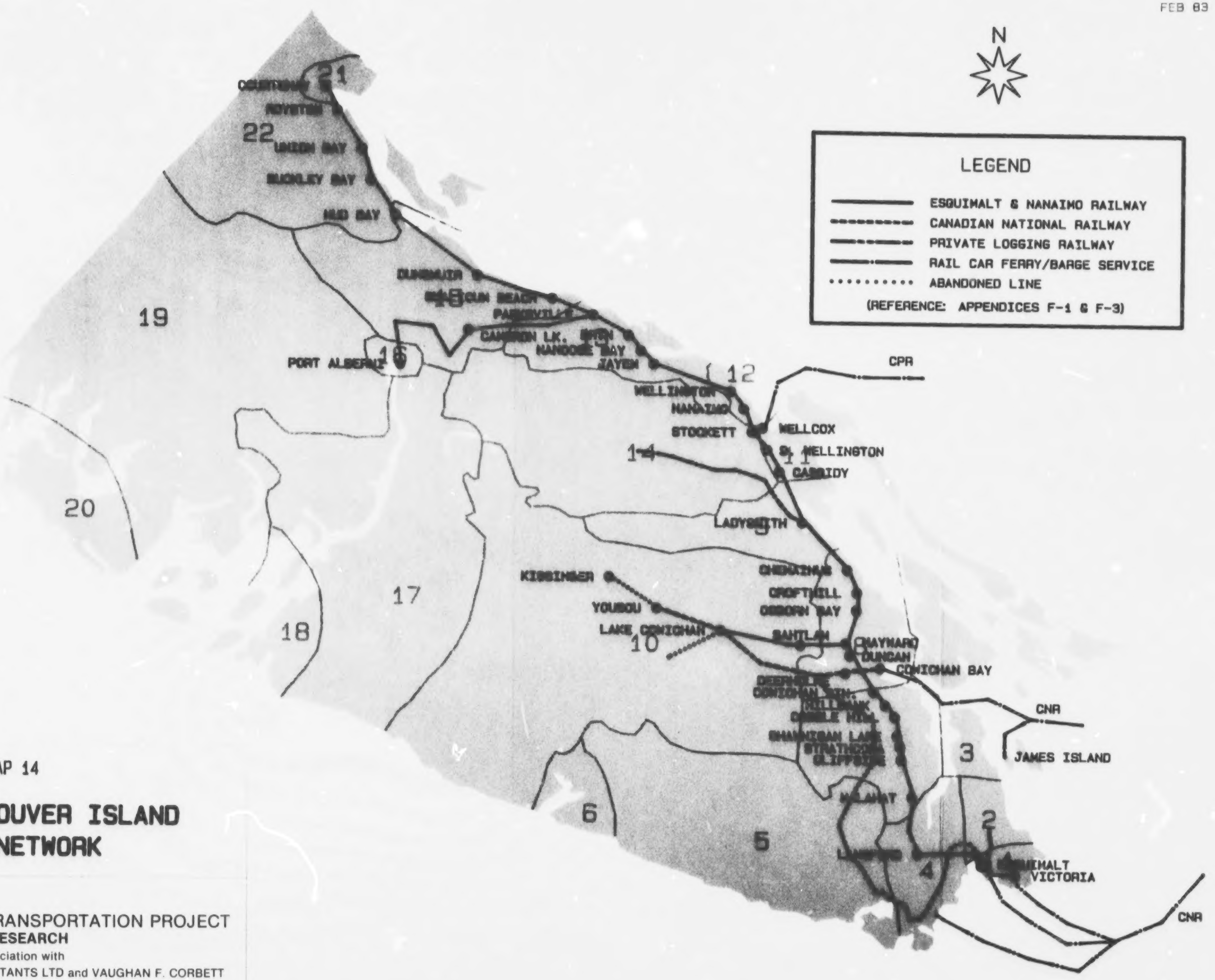
The ancillary lines from Parksville to Port Alberni and from Duncan to Lake Cowichan include 61 km. and 29 km. of track respectively. The section to Port Alberni has grades of over 2% and many sharp curves as it winds its way past Cameron Lake and through the mountains of the Vancouver Island Ranges. There are a total of 23 trestles, the longest being 147 m. The line to Lake Cowichan runs along the valley of the Cowichan River and crosses only 4 trestles. A description of some of the physical attributes of these three subdivisions is provided in Appendices F-1 and F-2.


FEB 83
N
LEGEND
ESQUIMALT & NANAIMO RAILWAY
CANADIAN NATIONAL RAILWAY
PRIVATE LOGGING RAILWAY
RAIL CAR FERRY/BARGE SERVICE
ABANDONED LINE
(REFERENCE: APPENDICES F-1 & F-3)
29
BEAVER COVE
NIMPKISH
27
25
23
26
24
COURTENAY
22
19
15
PARKSVILLE
13
PORT ALBERNI
16
CPR
12
NANAIMO
WELLCOX
14
CASSIDY
20
17
18
LAKE COWICHAN
10
DUNCAN
CNR
7
3
JAMES ISLAND
6
5
4
2
VICTORIA
CNR

MAP 13

VANCOUVER ISLAND
RAIL NETWORK

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT


FEB 83
N
LEGEND
ESQUIMALT & NANAIMO RAILWAY
CANADIAN NATIONAL RAILWAY
PRIVATE LOGGING RAILWAY
RAIL CAR FERRY/BARGE SERVICE
ABANDONED LINE
(REFERENCE: APPENDICES F-1 & F-3)
COURTENAY
21
ROYSTON
22
UNION BAY
BUCKLEY BAY
MUD BAY
DUNSMUIR
QUALICUM BEACH
15
PARKSVILLE
CAMERON LK.
BRECHIN
NANOOSE BAY
JAYEM
19
PORT ALBERNI
16
12
CPR
WELLINGTON
NANAIMO
WELLCOX
STOCKETT
S. WELLINGTON
14
11
CASSIDY
20
LADYSMITH
9
CHEMAINUS
KISSINGER
CROFTHILL
17
YOUBOU
OSBORN BAY
LAKE COWICHAN
SAHTLAN
10
MAYNARD
18
DUNCAN
COWICHAN BAY
DEERHOLME
COWICHAN STN.
HILLBANK
COBBLE HILL
CNR
SHAWNIGAN LAKE
STRATHCONA
CLIFFSIDE
3
JAMES ISLAND
MALAHAT
6
2
5
LANGFORD
ESQUIMALT
4
VICTORIA
CNR

MAP 14

SOUTH VANCOUVER ISLAND RAIL NETWORK

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

Rail-barge facilities with service to Vancouver are provided by C.P. Marine in the Nanaimo harbour.

1.2 C.N. Rail

Canadian National Railways owns and operates freight services on several segments of track at the southern end of Vancouver Island (see Map 14). From Cowichan Bay on the southeastern coastline of the Island, the CNR line runs 10 km. west and generally uphill to Deerholme, crossing 7 trestles. This segment is referred to as the Tidewater Subdivision. From here, the line heads further west and then northwest, extending 39 km. over 13 trestles to Youbou. This segment is called the Cowichan Subdivision. A description of some of the physical attributes of these two subdivisions is provided in Appendix F-3.

The Cowichan Subdivision includes segments of track from Youbou to Kissinger (22.5 km.) and from Deerholme to Victoria (93.3 km.) which were approved for abandonment in 1961 and 1979 respectively. However, 3 km. of track from the Cowichan Subdivision are still in use in the Victoria area. This section runs from the CNR yards at Point Ellice in downtown Victoria, northward to the "wye" at the Town and Country Shopping Centre. Connected to the track at this point is a 2.5 km. spur which runs northeast past Swan Lake to Borden Mercantile Co. Ltd. at the intersection of McKenzie Avenue and Quadra Street.

Rail-barge service to Vancouver is provided by the CNR at Cowichan Bay, James Island, Rocky Point, and at Point Ellice and Ogden Point in Victoria. Continuation of the service at Rocky Point was a condition attached to the abandonment approval given for the Cowichan Subdivision line between Victoria and Lake Cowichan.

2.0 PASSENGER TRAFFIC

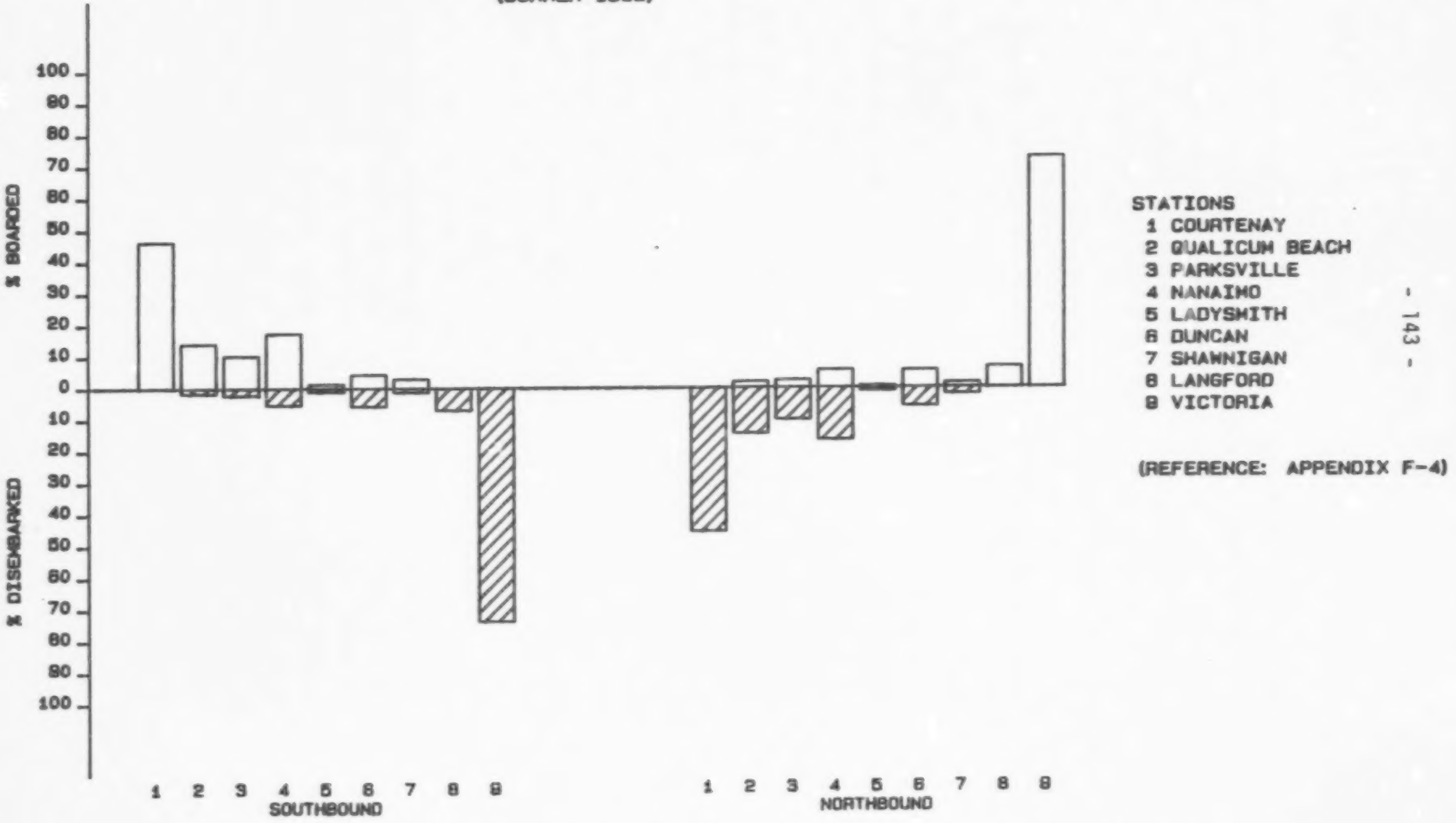
Passenger train service is provided by VIA Rail between Victoria and Courtenay, using the E & N Railway line. One return trip is operated daily, departing from Victoria at 8:15 a.m. and arriving in Courtenay at 12:35 p.m. The return trip leaves Courtenay at 1:05 p.m. and arrives in Victoria at 5:10 p.m. There are twenty-five stops along route, including regularly scheduled stops and flag stops.

The equipment used consists of two refurbished Rail Diesel Cars (RDC units) having a seating capacity of 92 and 96 passengers per car respectively, for a total of 188 when operated in tandem. On most days during the year, only one RDC unit is operated. The second unit is added only as demand dictates.

Figure F-1 shows the summer 1982 pattern of passengers boarding and disembarking the E & N Railway at the nine busiest stations along the route. From this chart it is evident that the majority (73%) of the northbound passengers board the train in Victoria and disembark somewhere between Nanaimo and Courtenay. On the southbound trip the converse is true.

From a detailed analysis of ticket sales during July and August 1982 (see Appendices F-4 and F-5) it was found that 1636 of the 4138 people who boarded at Victoria (40%) held tickets for Courtenay, whereas 1704 of the 2585 people who boarded at Courtenay (66%) held tickets for Victoria. The maximum number of passengers on the train at any one time occurred in the area of the Malahat Pass and represented approximately 80% of the total number of passengers handled along the entire route. Map 15 illustrates this average summer passenger traffic on the E & N Railway.

FIGURE F-1
FREQUENCY DISTRIBUTION OF
PASSENGER LOADINGS - E & N RAILWAY
(SUMMER 1982)



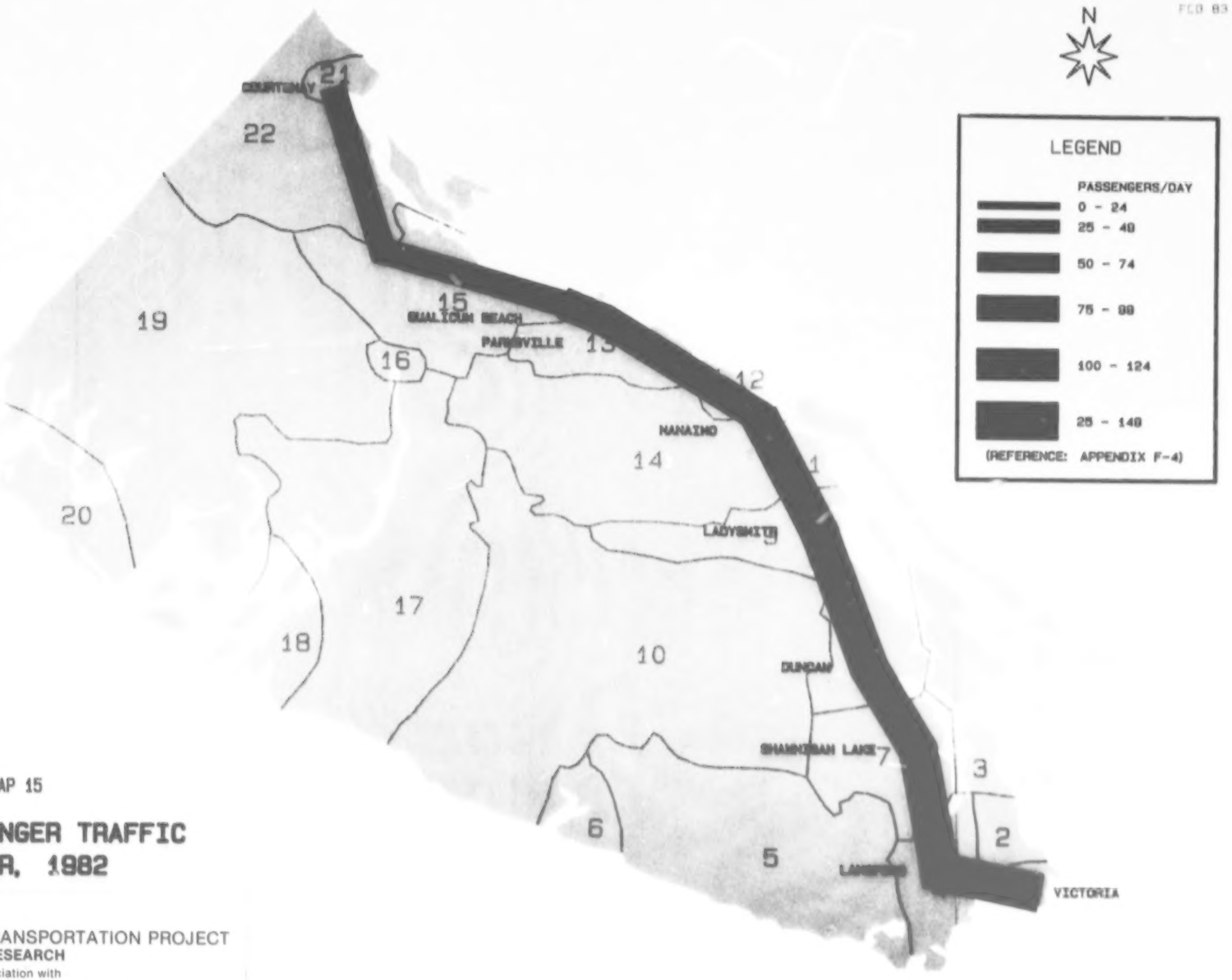
(REFERENCE: APPENDIX F-4)

B.C. RESEARCH

An analysis of ticket sales during February 1982 revealed a similar pattern of passenger loadings, although the total number of passengers handled was down substantially compared to the summer. Approximately 60% of passengers boarding at Victoria and 76% of those boarding at Courtenay held tickets for the entire one-way journey.

Annual passenger carryings are shown in Table F-1, covering the years from 1970 through 1981. As can be observed from this table, the number of passengers decreased in 1975 and 1976 and then increased dramatically from 1977 to 1979. Since 1979, the figures have dropped in each successive year. Several factors have contributed to these fluctuations in ridership.

On April 29, 1975 the train schedule between Victoria and Courtenay was reversed on an experimental basis to test the extent of the market for this reversed schedule. Thus, instead of originating the daily return trip at Victoria each morning, the trip departed from Courtenay in the morning and from Victoria in the late afternoon, Unfortunately, the experiment was interrupted after only two months, in July 1975, when service beyond Parksville had to be temporarily suspended because of a washed-out bridge. Although ridership up to that point had dropped, the reversed schedule had not really been fully tested. It was finally discontinued in November 1975, and service was returned to the regular morning departure from Victoria. It is impossible to tell from this aborted experiment whether the reversed schedule could draw a similar level of ridership as the regular schedule, nor is it clear whether the market for this reversed schedule is distinct from the regular market.


FCD 83
N
LEGEND
PASSENGERS/DAY
0 - 24
25 - 49
50 - 74
75 - 99
100 - 124
25 - 149
(REFERENCE: APPENDIX F-4)
COURTENAY
21
22
19
15
QUALICUM BEACH
PARKSVILLE
13
16
12
NANAIMO
14
11
20
LADYSMITH
9
17
18
10
DUNCAN
SHAWNIGAN LAKE
7
3
6
5
2
LANGFORD
VICTORIA

MAP 15

RAIL PASSENGER TRAFFIC
SUMMER, 1982

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

TABLE F-1

REVENUE PASSENGER CARRYINGS

E&N Railway

Year	Northbound	Southbound	Total
1970	11,217	8,716	19,933
1971	11,153	9,299	20,452
1972	10,101	9,226	19,327
1973	10,060	8,885	18,945
1974	11,374	9,568	20,942
1975[1]	5,102	6,398	11,500
1976[1]	4,166	2,744	6,940
1977[1]	6,662	4,657	11,319
1978	N/A	N/A	43,893
1979	27,662	27,249	54,911
1980	25,345	23,933	49,278
1981	22,347	20,341	42,688
1982[2]	18,300	20,200	38,500

Note:

[1] Passenger-train service was suspended between Parksville and Courtenay from July 1, 1975 until December 18, 1977.

[2] Annual estimate based on data to September, 1982.

Source:

Total 1978 Revenue Passenger Carryings: Eisler Report, November, 1980

1979, 1980 Figures: Leaving and Handling Reports January 1981, Montreal

1981 Figures: VIA Rail Leaving and Handling Reports, November 1981

1970-1977 Figures: Railway Transport Committee Rail Economic Analysis Branch October 24, 1978

As mentioned above, on July 1, 1975 service had to be suspended between Parksville and Courtenay, pending replacement of the wooden trestle bridges over French Creek and the Tsable River. Service on this section of the line was not resumed until December 18, 1977.

Patronage improved early in 1977 and again during the summer of 1977. The introduction of low one-day return fares effective June 1 through September 30 apparently contributed to this latter rise.

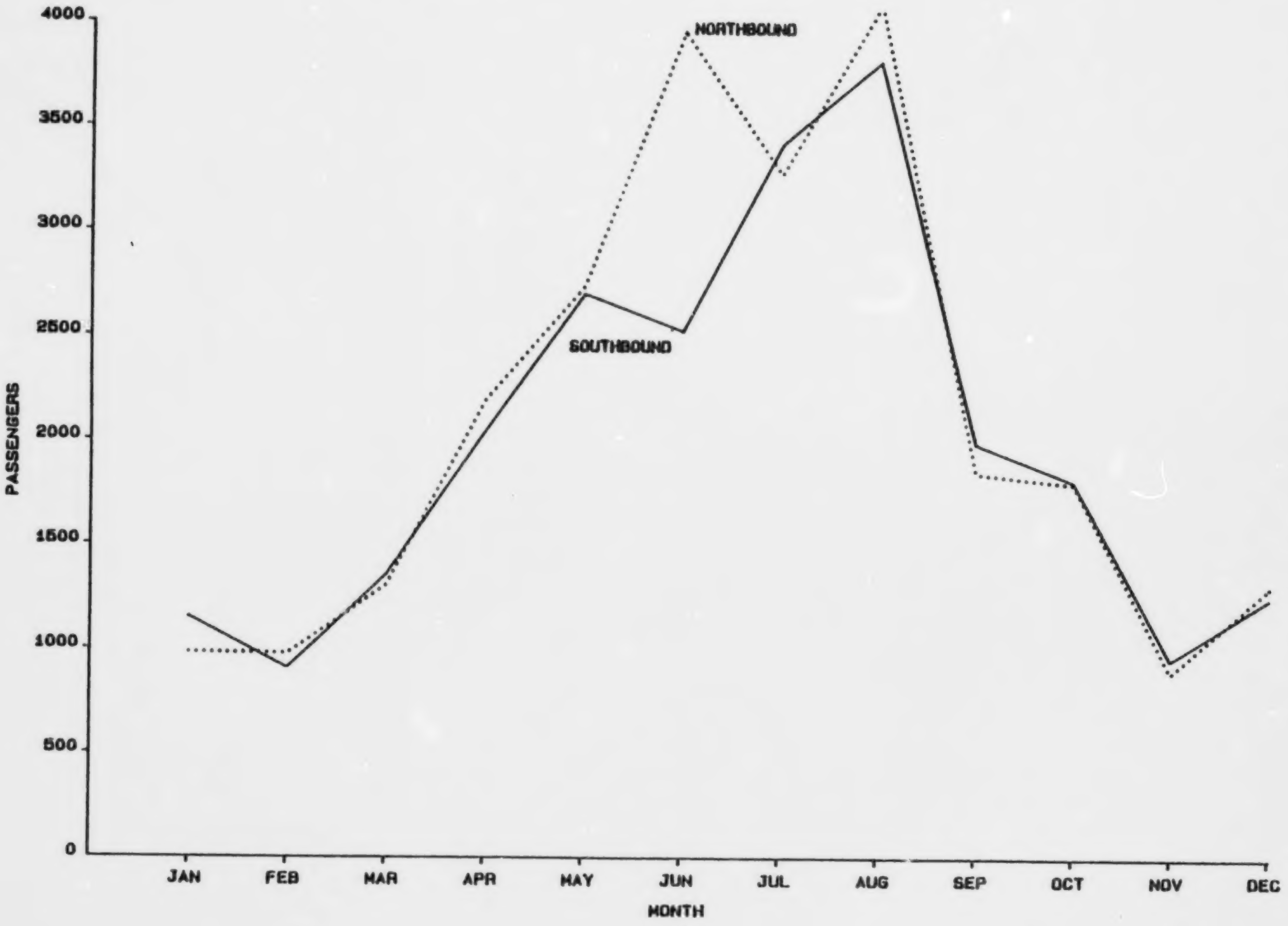
At about this time, CP Rail filed application with the Canadian Transport Commission (CTC) to discontinue passenger service on the E & N Railway. In December 1977 the CTC ordered service to be discontinued effective January 31, 1978. However the order was subsequently amended, delaying this date. Applications were made to the CTC Review Committee by the Provincial Government and public hearings were held. On November 17, 1978 the CTC ordered passenger service on the E & N Railway to be continued, with reconsideration of this order within 5 years.

The increase in ridership during 1978 and 1979 can be partially attributed to the increased publicity received during the public hearing process and through the efforts of the E & N Steering Committee, the United Transportation Union, and the Committee to Save the E & N, all of which served to publicise rail passenger service on the E & N. It is interesting to note that a decline in ridership on PCL bus services along the Victoria-Nanaimo corridor (see Appendix E-4) also occurred during this period of increased ridership on the E & N. While the PCL decline was much smaller than the total increase in E & N ridership, it is possible that these two transport modes have at least some proportion of their ridership market in common.

Declining ridership since 1979 has been attributed by the E & N Steering Committee to the lack of marketing, the existing fare structure and basic amenities. During 1981, VIA Rail began to increase its marketing effort by using radio and television commercials, full-page newspaper ads, printed brochures and by distributing train schedules. However, as may be seen from Table F-1, ridership has continued to decline.

Figure [illegible] illustrates the seasonality of E & N passenger carrying for 1980. Similar patterns were evident for other years. Ridership peaks during the summer months, with the northbound traffic reaching higher levels than southbound. On the northbound train, the months of June, July and August each account for approximately 16% of the annual passenger volume, with June and August counts higher than the July figures. On the southbound train, the months of July and August each account for 11% of the total annual ridership. It is not understood why the northbound train attracts more passengers than the southbound train or why its seasonal profile should be different in shape. However, this pattern has remained consistent over at least four successive years, from 1979 to 1982.

FIGURE F-2
MONTHLY PASSENGERS CARRIED
E & N RAILWAY
(1980)



(REFERENCE: APPENDIX F-8)

B.C. RESEARCH

3.0 FREIGHT TRAFFIC

3.1 C.P. Rail

Canadian Pacific Railway provides freight car service over the E & N network. Tables F-2 and F-3 show average freight car and freight tonnage movements from 1977 to 1981 over various segments of track in this network. Table F-4 shows the actual number of freight car carryings on CP Rail's Coastal Marine Operation between Nanaimo and Vancouver.

As is evident from these three tables and the associated graphs of Figure F-3, rail freight traffic has been steadily declining in all areas of the network except for the very low volume Courtenay to Parksville segment. Here the traffic volume has increased slightly since 1978. The most dramatic drop in traffic has occurred on the Lake Cowichan to Duncan line. This has been caused by the depressed markets for forest products and, most recently, by the shut down and dismantling of the sawmill at Honeymoon Bay. The traffic decline on this track segment has contributed to the declines observed on the Nanaimo to Duncan, Stockett to Wellcox and Naniamo to Vancouver segments. These lines link the Lake Cowichan area mills to their sales market on the Mainland and to seaports for shipping to overseas markets.

Table F-5 provides a commodity breakdown of the 1981 freight car movements on Vancouver Island, by station. Even in 1981, with the forest industry already in decline, 4,197 cars (49%) of the estimated total 8,559 freight car movements were carrying forest products. Had data for earlier years been available, the dominance of forest products would have been even more evident. The balance of the freight car movements break down as follows: 1,603 cars (19%) carried mining and construction materials, 1,256 cars (15%) consumer-related products (mostly wheat and grain), and 1,503 cars (17%) manufactured goods.

TABLE F-2

AVERAGE FREIGHT CAR MOVEMENTS - C.P. RAIL

	CAR-MILES PER MILE									
		WESTWARD OR NORTHWARD					EASTWARD OR SOUTHWARD			
	1977	1978	1979	1980	1981	1977	1978	1979	1980	1981
Courtenay-Parksville	N/A	710	910	940	1000	N/A	710	930	900	980
Parksville-Nanaimo (Stockett)	5650	6120	5580	5010	4530	5640	6090	5640	4930	4340
Nanaimo (Stockett)-Duncan (Hayward)	10060	10070	8100	4050	2770	10060	10300	8150	4100	2800
Duncan (Hayward)-Victoria	3410	3210	2850	2560	2680	3300	3220	2860	2510	2710
Port Alberni-Parksville	5560	5410	4670	4070	3530	5520	5380	4710	4030	3360
Lake Cowichan-Duncan (Hayward)	6650	6860	5250	1490	90	6760	7080	5290	1590	90
Nanaimo (Stockett)-Nanaimo (Wellcox)	15710	16190	13680	9060	7300	15700	16390	13790	9030	7140

Source: Statement of Cars and Tonnage Moved - C.P. Rail.

TABLE F-3

AVERAGE FREIGHT TONNAGE MOVEMENT - C.P. RAIL

	'000 TON-MILES PER MILE									
		WESTWARD OR NORTHWARD					EASTWARD OR SOUTHWARD			
	1977	1978	1979	1980	1981	1977	1978	1979	1980	1981
Courtenay-Parksville	N/A	29	51	46	25	N/A	28	42	27	19
Parksville-Nanaimo (Stockett)	55	60	84	86	73	239	268	246	189	147
Nanaimo (Stockett)-Duncan (Hayward)	298	309	236	87	25	101	105	127	101	88
Duncan (Hayward)-Victoria	53	58	56	37	24	88	88	102	86	84
Port Alberni-Parksville	46	31	33	40	48	230	240	204	162	128
Lake Cowichan-Duncan (Hayward)	245	251	180	50	1	13	17	25	15	4
Nanaimo (Stockett)-Nanaimo (Wellcox)	339	347	276	151	98	328	351	329	268	235

Source: Statement of Cars and Tonnage Moved - C.P. Rail (includes locomotive tonnage)

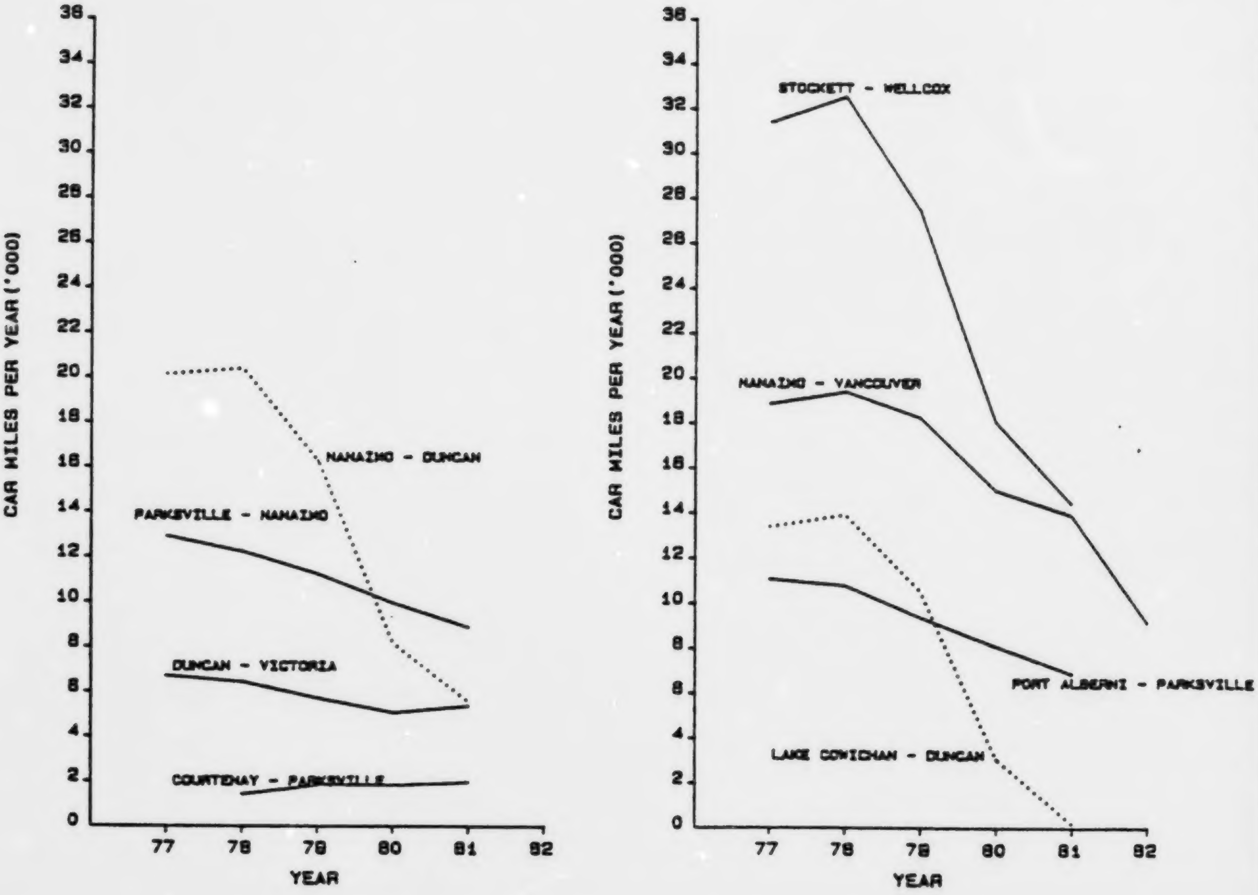
TABLE F-4

TOTAL FREIGHT CAR CARRYINGS - C.P. RAIL COASTAL MARINE OPERATIONS

	1977	1978	1979	1980	1981	1982
Nanaimo-Vancouver (total carryings, to and from)	18,890	19,419	18,264	15,025	13,920	9,171

Source: C.P. Rail, Coastal Marine Operations

FIGURE F-3
FREIGHT CAR MOVEMENTS
CP RAIL
1977 - 1982



(REFERENCE: TABLE F-2)

B.C. RESEARCH

TABLE F-5

1981 FREIGHT CAR MOVEMENTS
BY COMMODITY TYPE - C.P. RAIL

Station	Forest Products		Mining & Construction		Consumer Related		Manufacturing & Other		Estimated No. Empty*		Estimated Total Movements
	In	Out	In	Out	In	Out	In	Out	In	Out	
Courtenay IMS	-	-	3	-	-	-	26	-	0	29	29
Courtenay	1	271	129	86	-	-	9	3	360	139	499
Royston	3	7	-	-	-	-	-	-	7	3	10
Buckley Bay	-	-	9	-	-	-	16	-	0	25	25
Dunsmuir	-	-	6	-	-	-	1	-	0	7	7
Qualicum Beach	-	-	4	-	-	-	2	-	0	6	6
Subtotal	4	278	151	86	0	0	54	3	367	209	576
Parksville	1	75	44	-	-		6	-	75	51	126
Bryn	-	-	42	-	-	-	-	-	0	42	42
Wellington	-	-	-	-	-	-	-	1	1	-	1
Nanaimo	6	51	362	120	267	2	314	37	210	949	1159
Wellcox	125	124	2	3	-	-	14	1	128	141	269
Ladysmith	-	-	2	-	-	-	18	1	1	20	21
Chemainus	1	70	5	-	4	-	-	-	70	10	80
Crofthill	-	-	39	-	-	-	- 7	-	0	46	46
Somenos	1	1	11	-	-	-	-	-	1	12	13
Subtotal	134	321	507	123	271	2	359	40	486	1271	1757
Duncan	8	2	7	8	636	6	21	1	17	672	689
Cobble Hill	-	-	-	-	2	-	-	-	0	2	2
Malahat	-	8	-	-	-	-	-	-	8	-	8
Langford	3	25	57	72	1	-	3	-	97	64	161
Esquimalt	-	-	1	-	1	-	4	-	0	6	6
Victoria IMS	1	-	31	-	7	-	240	5	5	279	284
Victoria	130	400	306	8	326	2	711	48	458	1473	1931
Subtotal	142	435	402	88	973	8	979	54	585	2496	3081
Port Alberni	236	2646	225	8	2	-	11	3	2657	474	3131
Lake Cowichan	-	1	13	-	-	-	-	-	1	13	14
Grand Total	516	3681	1298	305	1246	10	1403	100	4096	4463	8559

Source: C.P. Rail - Report of Traffic Received and Originating on Vancouver Island - 1981.
* Estimated number of empty rail cars assumes zero backhaul.

Shipments into Courtenay are mostly liquefied petroleum gas, while those to Nanaimo are LPG, grain products and general manufactured goods. Duncan-bound shipments are almost all grain products, whereas shipments to Port Alberni include wood pulp, non-petroleum gases and salt cake. Victoria shipments include a wide variety of all products.

Shipments out of Courtenay include lead and zinc concentrates, lumber and other forest products. Port Alberni shipments are mainly lumber, plywood, pulp and paper. Victoria shipments are lumber and plywood. Nanaimo shipments include lumber, waste metals, machinery and non-petroleum gases.

In 1979, 850 carloads of material classified as "hazardous" were handled, representing about 4% of the total traffic (21,000 cars) on the system. Table F-6 shows a breakdown of these hazardous commodities.

Map 16 illustrates the 1980 freight traffic on the C.P. Rail network.

3.2 C.N. Rail

As mentioned before, Canadian National Railways provides freight car service to several places on Vancouver Island. Tables F-7 and F-8 show the number cars, both full and empty, delivered by barge to the five points served by CN Rail. Table F-9 shows the number of rail car movements on the Cowichan Subdivision. A sharp drop in the total number of rail car movements is readily apparent from these tables.

Table F-10 provides a commodity breakdown of the carloads moved by CN Rail. As is evident from this table, forest products again dominate the rail shipments.

Map 16 also illustrates the 1980 freight traffic on the CN Rail networks.

TABLE F-6

CARLOADS OF HAZARDOUS COMMODITIES CARRIED DURING 1979 - C.P. RAIL

	Victoria-Duncan	Duncan-Nanaimo	Nanaimo-Parksville	Parksville-Courtenay	Duncan Lake Cowichan
Liquid Propane Gas	188	188	139	63	47
Explosives	1	5	35	33	-
Chlorine	-	-	78	-	78
Acid	-	-	46	-	42
Sodium Dioxide	-	-	42	-	42
Caustic Soda	97	97	-	-	-
General	-	-	9	-	9
TOTAL	286	290	349	96	176

Source: Report on Certain Engineering Aspects of the Esquimalt and Nanaimo Railway, J.J. Eisler, 1980.

TABLE F-7

RAIL TRAFFIC BETWEEN VANCOUVER AND VANCOUVER ISLAND (INCLUDING JAMES ISLAND), CANADIAN NATIONAL RAILWAYS

	1978	1979	1980	1981	1982
Rail Carloads to Vancouver Island	761	819	1,238	825	568
Rail Carloads from Vancouver Island	3,112	2,495	1,452	1,204	868
Empties to Vancouver Island	3,200	2,264	1,133	1,040	774
Empties from Vancouver Island	687	812	1,036	759	660
Total	7,760	6,390	4,859	3,828	2,870

Source: CN Rail, Vancouver - March 1983.

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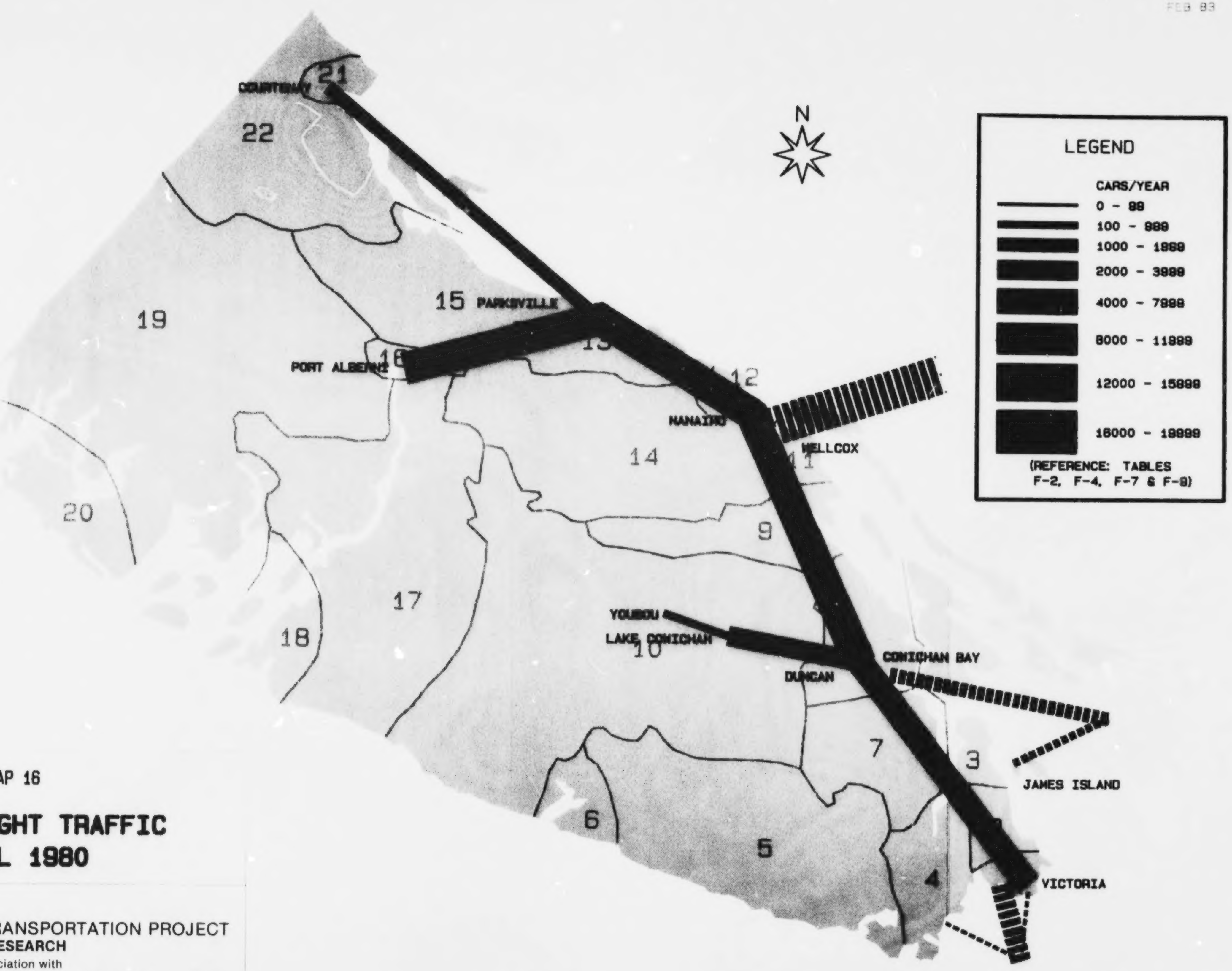

COURTENAY
21
22
19
15 PARKSVILLE
13
16
PORT ALBERNI
12
NANAIMO
WELLCOX
11
14
20
9
17
18
YOUBOU
LAKE COWICHAN
10
COWICHAN BAY
DUNCAN
7
3
JAMES ISLAND
6
5
4
VICTORIA
N
LEGEND
CARS/YEAR
0 - 99
100 - 999
1000 - 1999
2000 - 3999
4000 - 7999
8000 - 11999
12000 - 15999
16000 - 19999
(REFERENCE: TABLES F-2, F-4, F-7 & F-9)

MAP 16

RAIL FREIGHT TRAFFIC
TOTAL 1980

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

TABLE F-8

PERCENTAGE DISTRIBUTION OF RAIL CARS BY BARGE TERMINAL (1978-1982)

Point Ellice (Victoria)	59%
Ogden Point (Victoria)	0%
James Island	5%
Cowichan Bay - (proper)	20%
- (for points inland)	15%
Rocky Point	1%
	100%

Source: CN Rail, Vancouver - March 1983

TABLE F-9

RAIL TRAFFIC ON THE COWICHAN SUBDIVISION, CANADIAN NATIONAL RAILWAYS

Origin/Destination	1977	1978	1979	1980
Youbou	668	998	896	548
Lake Cowichan	10	164	64	4
Deerholme	14	8	0	0
Tyup	0	0	2	6
Total	690	1,170	962	558

Source: CNR Application for Proposed Line Abandonment, July 1979. Includes carloads and an estimated number of empty cars assuming zero backhaul.

TABLE F-10

PERCENTAGE DISTRIBUTION OF RAIL CARLOADS BY COMMODITY TYPE

	1978	1979	1980	1981	1981
Grain	1.8	2.4	3.0	4.1	7.8
Coal and Gas	1.3	2.9	5.5	6.0	11.0
Forest Products	79.5	64.0	50.5	52.0	62.0
General Merchandise	17.4	30.7	41.0	37.9	19.2
	100.0	100.0	100.0	100.0	100.0

Source: CN Rail, Vancouver - March 1983.

TABLE F-11

RAILWAY PASSENGER PROJECTIONS

Actual 1981	Growth Rate	Projected			
		1986	1991	1996	2001
42700	2.1%	47000	52000	58000	64000

4.0 RAIL PASSENGER PROJECTIONS

Since 1970, and probably much earlier, the E & N Railway has operated at progressively increasing losses. In 1981 these amounted to $1.05 million at a cost to revenue ratio of 5:1. The average cost per passenger was $30.88, as against average revenues of $6.11.

Because of the chronic losses, CP Rail filed several applications in the 1970's to discontinue the service. In December 1977, the CTC ordered the service discontinued effective January 31, 1978. However, following an appeal the service was continued, with the order to be reconsidered within five years (i.e. late 1983).

For the purposes of making rail passenger projections, it has been assumed that the E & N service will be continued throughout the forecast period, and that with appropriate marketing activities ridership market share can be maintained at 1981 levels.

It is important to note that this assumption represents a substantial turn-around to current ridership trends. Since 1979, the total number of passengers carried on the E & N Railway has been steadily declining. Increased marketing efforts during 1981 have not (at least to the end of 1982) reversed this decline, although they may have helped to offset additional declines resulting from the lower levels of economic activity experienced during late 1981 and throughout 1982. Unfortunately, very little is known about the rail passenger market on Vancouver Island, and the potential for expansion. However, the rapid rise in patronage which was experienced during the abandonment hearings suggests that with appropriate marketing and service strategies, the ridership could be rebuilt and maintained at 1981 levels of market share.

Thus passenger traffic on the E & N is forecast to have the potential to grow at the rate of population growth along the Victoria - Courtenay corridor, which is 2.1% per annum. This assumes that the current standard of service is maintained, prices are held at a fixed percentage of costs, and that service is effectively promoted. With these efforts, it is assumed that the growth potential can be realized. The resulting rail passenger figures are shown in the preceeding Table F-11. The capacity of the existing two Rail Diesel Cars and other rail infrastructure should be sufficient to meet the projected demand. In previous years, the peak month of the year has represented about 16% of the annual total. Assuming this pattern continues, the peak month in the year 2001 would account for 10,200 passengers.

The capacity of 2 RDC's in tandem is 188 passengers or 11,650 per month in the summer. However, previous analysis has shown that only 80% of the passengers carried are on the train at any given time, so that the effective capacity is actually 14,560 passengers. Thus, the 10,200 projected for the peak month in 2001 represents a 70% utilization of the available capacity. While this may pose too high a utilization rate, leading to frustrated passengers and a decline in ridership, it would occur only during two or three months of the year, and even then probably only on weekends.

It may be noted that the 2.1% growth rate for railway passenger traffic on Vancouver Island is much more conservative than the 4.1% growth rate projected for British Columbia by Transport Canada (Table B-4).

5.0 RAIL FREIGHT PROJECTIONS

Since 1979, rail freight traffic on Vancouver Island has dropped sharply. As shown previously in Table F-4, the annual number of freight cars carried on CP Rail's Coastal Marine service between Vancouver and Nanaimo was in the range of 19,000 cars prior to 1980. However, by 1982 the number of cars carried had dropped to 9,000. Similarily, Table F-7 indicated that the annual number of freight cars carried on the C.N. Rail barge service dropped from over 7,000 in 1978 to less than 3,000 in 1982.

While some of this fall may have been caused by a shift in transport mode from rail to truck, most appears to be due to the depressed lumber markets. Even in 1981, during a relatively poor economic climate for the forest industry, Tables F-4 and F-9 show that forest products made up approximately 50% of all rail shipments on the Island. Thus, it is reasonable to assume that rail traffic will pick up again as lumber markets improve.

For the purposes of making projections, it is assumed that by 1986 rail traffic will again reach the levels experienced in 1980. The only exception to this is the line from Duncan to Lake Cowichan. As the mill at Honeymoon Bay has been permenantly closed, it is assumed that rail traffic on this line will continue at the 1982 levels through to 1986.

Beyond 1986, it is assumed that the forest product component of rail freight traffic will cease to grow, reflecting the future outlook for the forest industry on Vancouver Island. For other commodities it is assumed that rail traffic will follow the population growth rates in the zones served by the rail network. The resulting growth rate assumptions and projected rail traffic are shown in Table F-12. These projected traffic levels do not exceed the capacity of the rail network, provided the existing lines are maintained at present standards.

TABLE F-12

RAIL FREIGHT PROJECTIONS

Ferry	Actual 1980	Growth Rate*	Projected 1986	Projected 1991	Projected 1996	Projected 2001
C.P.R.						
Courtenay - Parksville	1,840	1.8%	1,800	1,970	2,150	2,350
Parksville - Nanaimo	9,940	2.7%	9,900	11,310	12,920	14,760
Nanaimo - Duncan	8,150	0.6%	8,100	8,350	8,600	8,860
Duncan - Victoria	5,070	1.3%	5,000	5,330	5,690	6,070
Port Alberni - Parksville	8,100	0.1%	8,100	8,140	8,180	8,220
Lake Cowichan - Duncan	3,080	0.7%	150	155	160	165
C.P.R. MARINE						
Nanaimo - Vancouver	15,025	1.1%	15,000	15,840	16,730	17,670
C.N.R.						
Vancouver - Victoria	2,860	0.7%	2,860	2,960	3,070	3,180
Vancouver - Cowichan Bay	1,700	1.2%	1,700	1,800	1,920	2,030
Vancouver - James Island	240	0.7%	240	250	260	270
Vancouver - Rocky Point	50	0.7%	50	52	54	56
Cowichan Bay - Youbou	560	0.4%	560	570	580	590
Total CNR	5,410	0.8%	5,410	5,632	5,884	6,126

* Annual growth rate projected 1986-2001.

6.0 SUMMARY

Two railways, Canadian Pacific Railway (CPR) and Canadian National Railways (CNR), provide freight services on Vancouver Island, both with connecting rail-barge services to the B.C. Lower Mainland. The CPR operates on the line known as the Esquimalt and Nanaimo Railway (E & N), extending between Victoria and Courtenay with ancillary lines to Port Alberni and Lake Cowichan. The CPR rail-barge service operates out of Nanaimo and provides several sailings daily to downtown Vancouver. The CNR operates a short stretcn of track in the downtown Victoria area and a longer line running from Cowichan Bay inland to Youbou. Its rail-barge service operates out of Cowichan Bay, James Island, Rocky Point, and from Point Ellice and Ogden Point in Victoria, providing sailings to Tilbury Island in Vancouver.

Passenger service is available along the main line of the E & N railway and is operated by VIA Rail. Two Rail Diesel Cars, with a total seating capacity of 188 passengers, are used on a daily, return-trip schedule between Victoria and Courtenay. In 1981, nearly 42,700 passengers were handled on this line, with 48% of these being carried during the summer months of June, July and August.

For the purposes of preparing rail passenger projections, it was assumed that the E & N rail line would continue to operate and that VIA Rail would employ appropriate and effective marketing and rail service strategies so as to maintain their 1981 share of the passenger transportation market. Under this assumption, rail passenger traffic is projected to grow at an average annual rate of 2.1% from the 42,700 passengers handled in 1981 to approximately 64,000 passengers in the year 2001.

Rail freight car traffic handled by CPR and CNR, both on and to and from Vancouver Island, declined steadily from 1978 to 1982. For example, rail-barge carryings by CPR and CNR were 19,400 and 7,700 cars respectively in 1978, but had dropped to only 9,200 and 2,900 cars respectively by 1982. As a substantial proportion of the freight traffic is forest products, the economic downturn in that industry, beginning in 1980, has no doubt contributed to this decline.

For rail freight projections, it was assumed that economic recovery in the forest industry would enable rail freight traffic to return to the 1980 levels by the year 1986. Beyond 1986, the forest product component of rail freight traffic will cease to grow but other commodities would follow population growth rates. By the year 2001, total traffic would reach 17,700 cars/year on the CPR rail-barge service (as compared to 15,000 in 1980) and 6,100 cars/year on the CNR service (as compared to 5,400 in 1980).

G. AIR

G. AIR

1.0 AIR FACILITIES AND AIR SERVICES

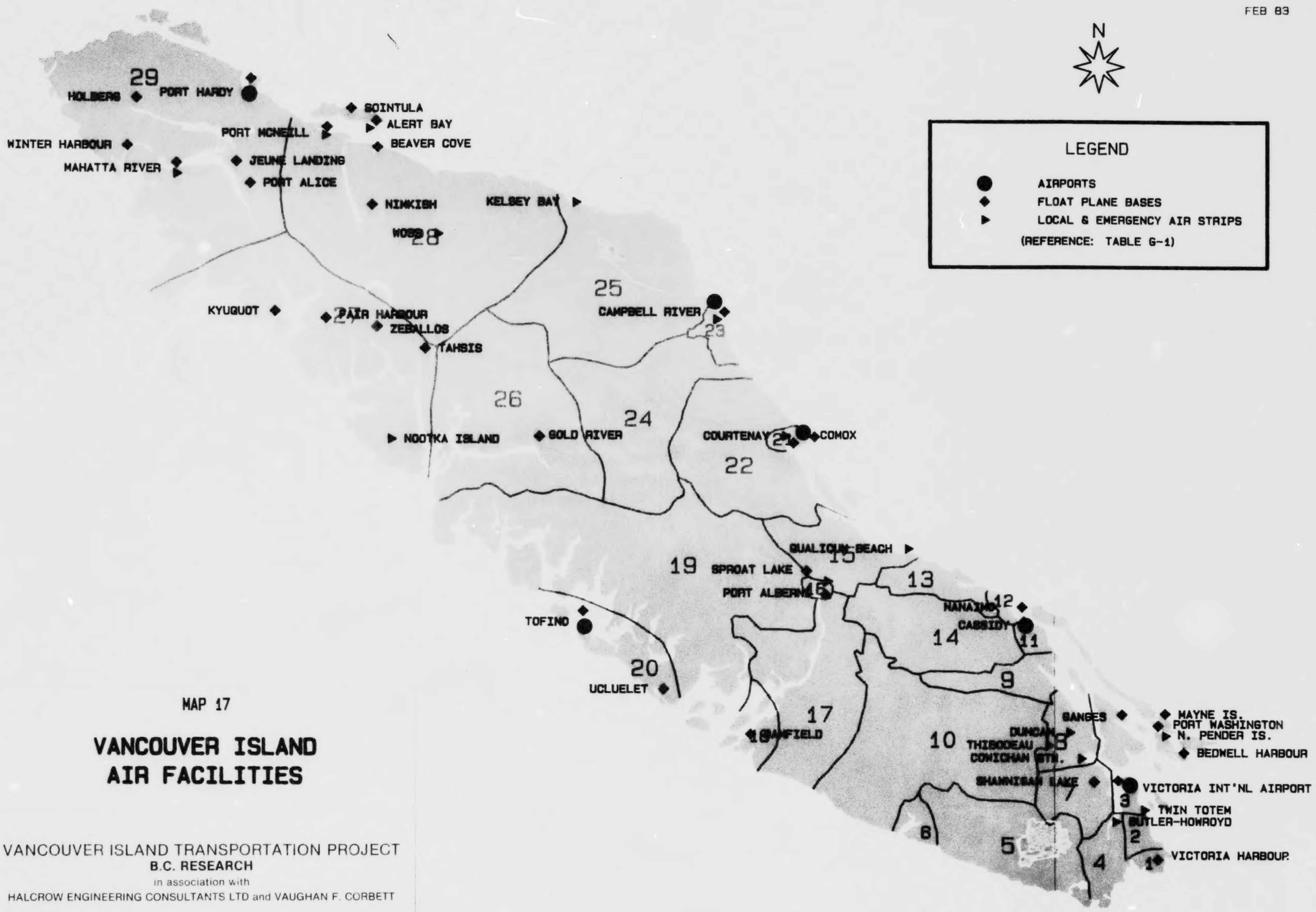
Air transportation services on and to Vancouver Island are provided through a network of 54 air facility locations. These facilities range in size from harbours or coves which have a small float plane wharf, to the major Victoria International Airport which handles 600,000 passengers and 200,000 aircraft movements in a year. Map 17 shows the geographic location of these facilities, broken down into three categories: 6 major airports, 16 local or emergency air strips (usually nothing more than a grassy field) and 32 float plane bases. Table G-1 provides a brief description of the runway and air service facilities provided at the six airports and three of the local air strips.

Operating out of these various locales are a total of 33 air carriers which hold Class 1, 2, 3 or 4 licenses for points on Vancouver Island. Class 1 and 2 licenses require the air carrier to provide regular air services (i.e. fixed schedule) between the points named on their license. A class 3 license allows the operation of irregularly scheduled services between the points named. Such flights will depart only if there are revenue passengers or freight to be carried. Class 4 designates that air charter, rental, or contract services can be offered. Table G-2 lists these carriers by class of service provided and Map 18 indicates which carriers held class 1, 2 or 3 licenses as of December 1982 at each air facility on the Island.

TABLE G-1

AIR FACILITY CHARACTERISTICS

AIRCRAFT LOCATION	OPERATOR	LICENSE	RUNWAY	SURFACE	FSS/AERADIO	FUEL	PHONE	SERVICES	CUSTOMS
VICTORIA	TRANSPORT CANADA	PUBLIC-IFR	5,000x200 5,030x200 7,000x200	ASPHALT	✓	✓	✓	✓	✓
NANAIMO (CASSIDY)	CITY OF NANAIMO	PUBLIC-NIGHT VFR	5,000x200	ASPHALT	✓	✓	✓	✓	✓
QUALICUM	VILLAGE OF QUALICUM	PUBLIC-DAY VFR	2,900x75 CENTER 30	GRAVEL ASPHALT		✓	✓	✓	
PORT ALBERNI	MACMILLAN BLOEDEL & POWELL RIVER LTD.	PRIVATE-DAY VFR	2,100x150	TURF		✓	✓		✓
COMOX	DEPT. NATIONAL DEFENCE	MILITARY-IFR	5,000x200 10,000x200	ASPHALT CONCRETE	✓		NO SERVICES FOR CIVIL AIRCRAFT EXCEPT EMERGENCY FUEL		
CAMPBELL RIVER	DIST. OF CAMPBELL RIVER	PUBLIC-IFR	5,000x150	ASPHALT	✓	✓	✓	✓	✓
ALERT BAY	VILLAGE OF ALERT BAY	PUBLIC-DAY VFR	2,500x75	ASPHALT		EMERGENCY FUEL			
PORT HARDY	TRANSPORT CANADA	PUBLIC-IFR	2-4,000x150 5,000x150	ASPHALT	✓	✓	✓	✓	
TOFINO	TRANSPORT CANADA	PUBLIC-DAY VFR	3-5,000x150	CONCRETE	✓	✓	✓		✓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N
LEGEND
● AIRPORTS
◆ FLOAT PLANE BASES
▶ LOCAL & EMERGENCY AIR STRIPS
(REFERENCE: TABLE G-1)
29
HOLBERG
PORT HARDY
SOINTULA
ALERT BAY
PORT MCNEILL
BEAVER COVE
WINTER HARBOUR
MAHATTA RIVER
JEUNE LANDING
PORT ALICE
NIMKISH
KELSEY BAY
WOSS
28
25
CAMPBELL RIVER
23
KYUQUOT
27
FAIR HARBOUR
ZEBALLOS
TAHSIS
26
24
NOOTKA ISLAND
GOLD RIVER
COURTENAY
21
COMOX
22
QUALICUM BEACH
15
19
SPROAT LAKE
PORT ALBERNI
16
13
NANAIMO
12
CASSIDY
11
14
TOFINO
20
UCLUELET
9
17
BAMFIELD
18
10
DUNCAN
8
THIBODEAU
COWICHAN STN.
GANGES
MAYNE IS.
PORT WASHINGTON
N. PENDER IS.
BEDWELL HARBOUR
SHAWNIGAN LAKE
7
VICTORIA INT'NL AIRPORT
3
TWIN TOTEM
BUTLER-HOWROYD
2
6
5
4
1
VICTORIA HARBOUR.

MAP 17

VANCOUVER ISLAND
AIR FACILITIES

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

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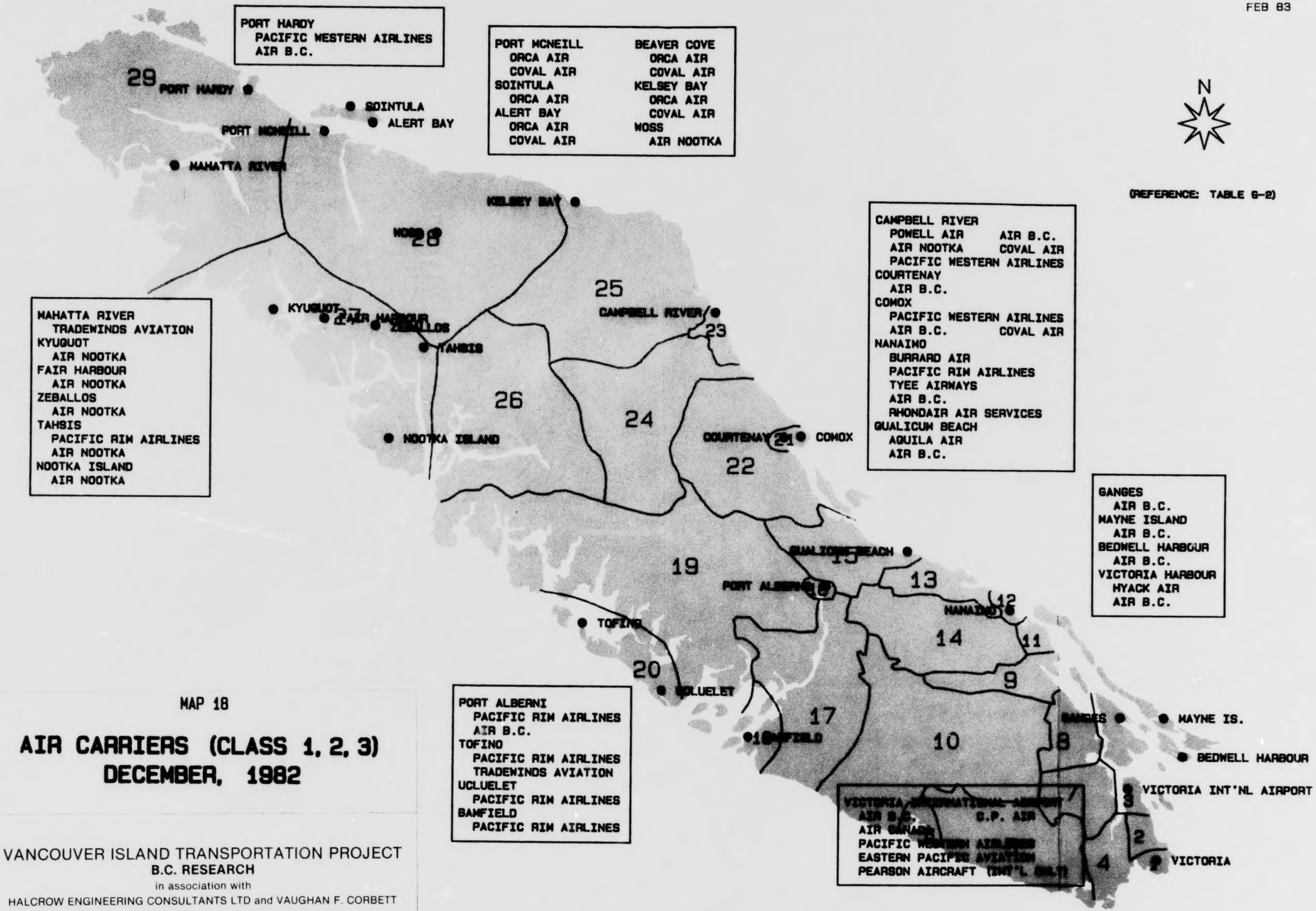


N
29
PORT HARDY
SOINTULA
ALERT BAY
PORT MCNEILL
MAHATTA RIVER
KELSEY BAY
WOSS
28
25
KYUQUOT
27
FAIR HARBOUR
ZEBALLOS
TAHSIS
CAMPBELL RIVER
23
26
24
NOOTKA ISLAND
COURTENAY
21
COMOX
22
QUALICUM BEACH
15
19
13
PORT ALBERNI
16
12
NANAIMO
TOFINO
14
11
9
20
UCLUELET
17
18
BAMFIELD
10
8
GANGES
MAYNE IS.
BEDWELL HARBOUR
VICTORIA INT'NL AIRPORT
3
2
4
1
VICTORIA

(REFERENCE: TABLE 6-2)

PORT HARDY
  PACIFIC WESTERN AIRLINES
  AIR B.C.

PORT MCNEILL
  ORCA AIR
  COVAL AIR
SOINTULA
  ORCA AIR
ALERT BAY
  ORCA AIR
  COVAL AIR

BEAVER COVE
  ORCA AIR
  COVAL AIR
KELSEY BAY
  ORCA AIR
  COVAL AIR
WOSS
  AIR NOOTKA

MAHATTA RIVER
  TRADEWINDS AVIATION
KYUQUOT
  AIR NOOTKA
FAIR HARBOUR
  AIR NOOTKA
ZEBALLOS
  AIR NOOTKA
TAHSIS
  PACIFIC RIM AIRLINES
  AIR NOOTKA
NOOTKA ISLAND
  AIR NOOTKA

CAMPBELL RIVER
  POWELL AIR AIR B.C.
  AIR NOOTKA COVAL AIR
  PACIFIC WESTERN AIRLINES
COURTENAY
  AIR B.C.
COMOX
  PACIFIC WESTERN AIRLINES
  AIR B.C. COVAL AIR
NANAIMO
  BURRARD AIR
  PACIFIC RIM AIRLINES
  TYEE AIRWAYS
  AIR B.C.
  RHONDAIR AIR SERVICES
QUALICUM BEACH
  AGUILA AIR
  AIR B.C.

GANGES
  AIR B.C.
MAYNE ISLAND
  AIR B.C.
BEDWELL HARBOUR
  AIR B.C.
VICTORIA HARBOUR
  HYACK AIR
  AIR B.C.

PORT ALBERNI
  PACIFIC RIM AIRLINES
  AIR B.C.
TOFINO
  PACIFIC RIM AIRLINES
  TRADEWINDS AVIATION
UCLUELET
  PACIFIC RIM AIRLINES
BAMFIELD
  PACIFIC RIM AIRLINES

VICTORIA INTERNATIONAL AIRPORT
  AIR B.C. C.P. AIR
  AIR CANADA
  PACIFIC WESTERN AIRLINES
  EASTERN PACIFIC AVIATION
  PEARSON AIRCRAFT (INT'L ONLY)

MAP 18

AIR CARRIERS (CLASS 1, 2, 3)
DECEMBER, 1982

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

TABLE G-2

AIR CARRIERS SERVING VANCOUVER ISLAND

Scheduled Services (Class 1 and Class 2)

Air B.C.
Air Canada
C.P. Air
Pacific Western Airlines
Powell Air

Unit Toll Services Only (Class 3)

Aquila Air
Air Nootka
Burrard Air
Coval Air
Eastern Pacific Aviation
Hyack Air*
Orca Air
Pacific Rim Airlines
Pearson Aircraft**
Powell Air
Tradewinds Aviation
Tyee Airways

Charter Services Only (Class 4)

Air B.C.
Air Canada
Air Nootka
Aquila Air
Burrard Air
C.P. Air
Coolaire Aviation*
Cougar Air
Flight Centre Victoria
Gulf Air Aviation (1981)
Hyack Air
Juan Air (1979)*
Kenmore Air Harbour**
Minstrel Air
Pacific Rim
Pacific Western
Pearson Aircraft**
Powell Air
Rhondair Air Service
Staron Flight (1972)**
Thunderbird Air***
Tradewinds Aviation
Tyee Airways
Yellow Bird***

Helicopter Charter Services (Class 4)

Highland Helicopters***
Long Beach Helicopters
Okanagan Helicopters
Queen Charlotte Helicopters***
Tri-Western Helicopters
Vancouver Island Helicopters

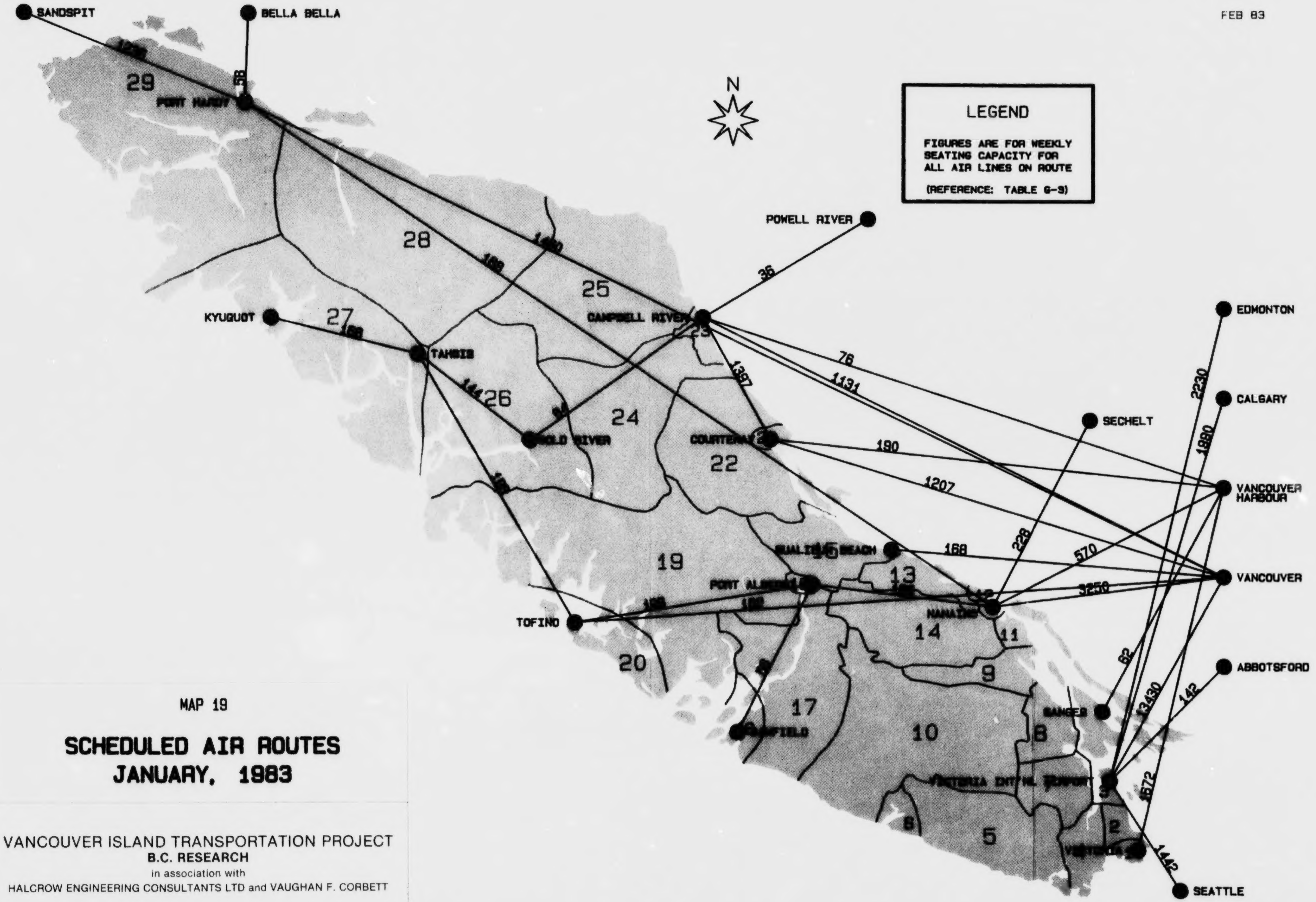
*Service not yet in operation
**International service only.
***Charter service is not based on Vancouver Island.

Source: Directory of Canadian Commercial Air Services, Dec. 1982.

Table G-3 briefly describes the series of air routes flown by each air carrier, and for each route segment gives the frequency of flights per week, the current seating capacity (seats per week) and the type of aircraft utilized on each route as of January 1983. If two seat capacity figures are provided (e.g. 350/560), this indicates that two aircraft are available for assignment to the same route whenever the traffic load warrants this level of service.

Map 19 illustrates this complex network of air routes and shows the total round trip weekly seating capacity on each route segment. This map clearly shows that the vast majority of flights connect the eastern coast of the Island with the Mainland. Very few flights run east-west across the Island, or provide services along its western coast. While this is partly due to the limited population along the western half of the Island, it also reflects the difficult flying conditions due to generally poor weather along the west coast throughout the fall and winter seasons and the very limited navigational aids once across the ridge of mountains which runs the length of the Island.

In addition, it should be noted that air services from Vancouver Island to off-Island points include the following locations (figures in brackets indicate total seating capacity per week as of January 1983): Vancouver (20,808); Vancouver Harbour (2,722); Edmonton (2,230); Calgary (1,990); Seattle (1,442); Sandspit (1,236); Sechelt (228); Abbotsford (142); Bella Bella (56); and Powell River (36).


FEB 83
SANDSPIT
BELLA BELLA
29
58
PORT HARDY
N
28
188
25
POWELL RIVER
36
CAMPBELL RIVER
23
KYUQUOT
27
168
TAHSIS
26
24
GOLD RIVER
COURTENAY
22
76
1131
190
1207
SECHELT
EDMONTON
2230
CALGARY
1880
VANCOUVER HARBOUR
VANCOUVER
19
QUALICUM BEACH
168
228
570
3250
PORT ALBERNI
13
NANAIMO
14
11
TOFINO
20
9
17
10
8
GANGES
62
13430
142
ABBOTSFORD
VICTORIA INT'NL AIRPORT
3
2
5
6
1672
VICTORIA
1442
SEATTLE

LEGEND

FIGURES ARE FOR WEEKLY SEATING CAPACITY FOR ALL AIR LINES ON ROUTE

(REFERENCE: TABLE G-3)

MAP 19

SCHEDULED AIR ROUTES
JANUARY, 1983

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

TABLE G-3

SCHEDULED AIR ROUTES AND FLIGHT FREQUENCIES BY AIR CARRIER

(AS OF JANUARY 1983)

		Outward Bound			Return Flight		
		Flights per week	Seating Capacity per week	Air-craft	Flights per week	Seating Capacity per week	Air-craft
Air Canada							
Victoria	- Vancouver	14	1891	725	14	1891	725
	- Calgary	7	1115	725	7	875	D9S
	- Edmonton	7	1115	725	7	1115	725
C.P. Air							
Victoria	- Vancouver	13	1339	737	13	1339	737
Pacific Western Airlines							
Victoria	- Vancouver	26	2678	737	26	2678	737
	- Seattle	7	721	737	7	721	737
Port Hardy	- Vancouver	6	618	737	6	618	737
	- Sandspit	6	618	737	6	618	737
Campbell River	- Vancouver	11	1131	737	-	-	-
	- Comox	11	1131	737	-	-	-
Comox	- Vancouver	-	-	-	11	1131	737
Air B.C.							
Port Hardy	- Vancouver	7	196	DC3	1	28	DC3
	- Bella Bella	1	28	DC3	1	28	BEA
	- Nanaimo	-	-	-	6	168	DC3
Nanaimo	- Vancouver	59	1117	DHT	65	1235	DHT+DC3
	- Vancouver H.	15	285	DHO	15	285	DHO
Victoria	- Vancouver	43	817	DHT	43	817	DHT
Victoria H.	- Vancouver H.	44	836	DHT	44	836	DHT
Campbell River	- Comox	9	171	DHT	5	95	DHT
	- Vancouver H.	-	-	-	4	76	DHT
Comox	- Vancouver H.	5	95	DHT	5	95	DHT
	- Vancouver	4	76	DHT	-	-	-
Ganges	- Vancouver H.	3	31	DC3	3	31	BEA
Aquila Air							
Qualicum	- Vancouver	21w 28s	84/147 112/196	APP/CES APP/CES	21w 28s	84/147 112/196	APP/CES APP/CES
Air Nootka							
Tahsis	- Gold River	12	72/118	BEA/CES	12	72/118	BEA/CES
	- Kyuquot	14	84/126	BEA/CES	14	84/126	BEA/CES
Gold River	- Campbell River	7	42/63	BEA/CES	7	42/63	BEA/CES
Burrard Air							
Nanaimo	- Vancouver	35w 56s	350/560 560/896	NAV/BNI NAV/BNI	35w 56s	350/560 560/896	NAV/BNI NAV/BNI
Coval Air							
Campbell River	- Kelsey Bay - Beaver Cove - Alert Bay - Port McNeill - Mainland Points	N/A**	10/16	OTT/BEA	N/A	10/16	DHO/BEA
Eastern Pacific							
Victoria	- Abbotsford	14	71	NAV	14	71	N/A
Hyack Air							
Victoria H.	- New West. H.*	3	31	DHO	3	31	DHO
Orca Air							
Alert Bay	- Port McNeill - Kelsey Bay - Beaver Cove - Sointula - Mainland Points	N/A**	7	BEA	N/A	7	BEA
Pacific Rim Airlines							
Tofino	- Tahsis	14	98/196	BEA	14	98/196	BEA
	- Port Alberni	14	98/196	BEA	14	98/196	BEA
Port Alberni	- Nanaimo	14	98/196	BEA	14	98/196	BEA
	- Bamfield	7	28/56	CES	7	28/56	CES
Nanaimo	- Vancouver	14	98/196	BEA	14	98/196	BEA
Powell Air							
Campbell River	- Powell River	3	18/24	BEA	3	18/24	BEA
Tradewinds Aviation*							
Tofino	- Vancouver	8	81	N/A	8	81	N/A
Tyee Airways							
Nanaimo	- Sechelt	19	114/171	BEA/CES	19	114/171	BEA/CES

LEGEND

737	Boeing 737	NAV	Piper Navajo	DHO	Dehavilland Otter	D9S	McDonnell Douglas DC9-Stretch
725	Boeing 727-211	APP	Piper Apache	BEA	Beaver	N/A	Not Available
DHT	Dehavilland Twin Otter	DC3	Dakota C47	CES	Cessna	w	Winter Service
		BNI	BN Islander	*	Not yet in operation	s	Summer Service
				**	No fixed schedule		

Seating capacities for which two alternate figures are provided (e.g. 114/171) indicate that multiple aircraft are available for assignment to the flight should traffic loads warrant this level of service.

Source: Official Airline Guide, January, 1983 and Telephone Follow-Up Survey.

2.0 PASSENGER TRAFFIC

Unfortunately, passenger statistics are published only for national and regional air carriers and for the major air facilities. No statistics are available for smaller carriers and air charter services or for most of the smaller air strips and float plane bases. Table G-4 shows the 1980 passenger statistics at each of the air facilities for which statistics are available. Passenger figures for 1981 and 1982 are not yet available.

Victoria International is, by far, the busiest of the airports on Vancouver Island, with over 600,000 passengers enplaned and deplaned during 1980. The next two busiest air facilities are Campbell River and Victoria Harbour with 80,000 to 90,000 passengers per year. Nanaimo (Cassidy Airport), Port Hardy, Nanaimo Harbour and Comox each recorded between 40,000 and 70,000 passengers.

Figure G-1 illustrates how passenger traffic and the number of air carrier and commercial aircraft movements at several of the air facilities on Vancouver Island have changed during the period from 1976 to 1981 (see Appendices G-1 and G-2 for additional data). As is evident from these graphs, there has been a steady increase in passenger traffic (approximately 9% growth per year) and a similar increase in the number of aircraft movements at Victoria International Airport. Traffic at other airports has been more erratic, partly due to a prolonged labour dispute involving Air West Airlines Ltd (forerunner of Air B.C.). However, in general there has been increased passenger traffic recorded at Campbell River and Victoria Harbour with only nominal declines at Nanaimo Harbour, Port Hardy and Tofino. Aircraft movements are up at all three airports shown in the graph.

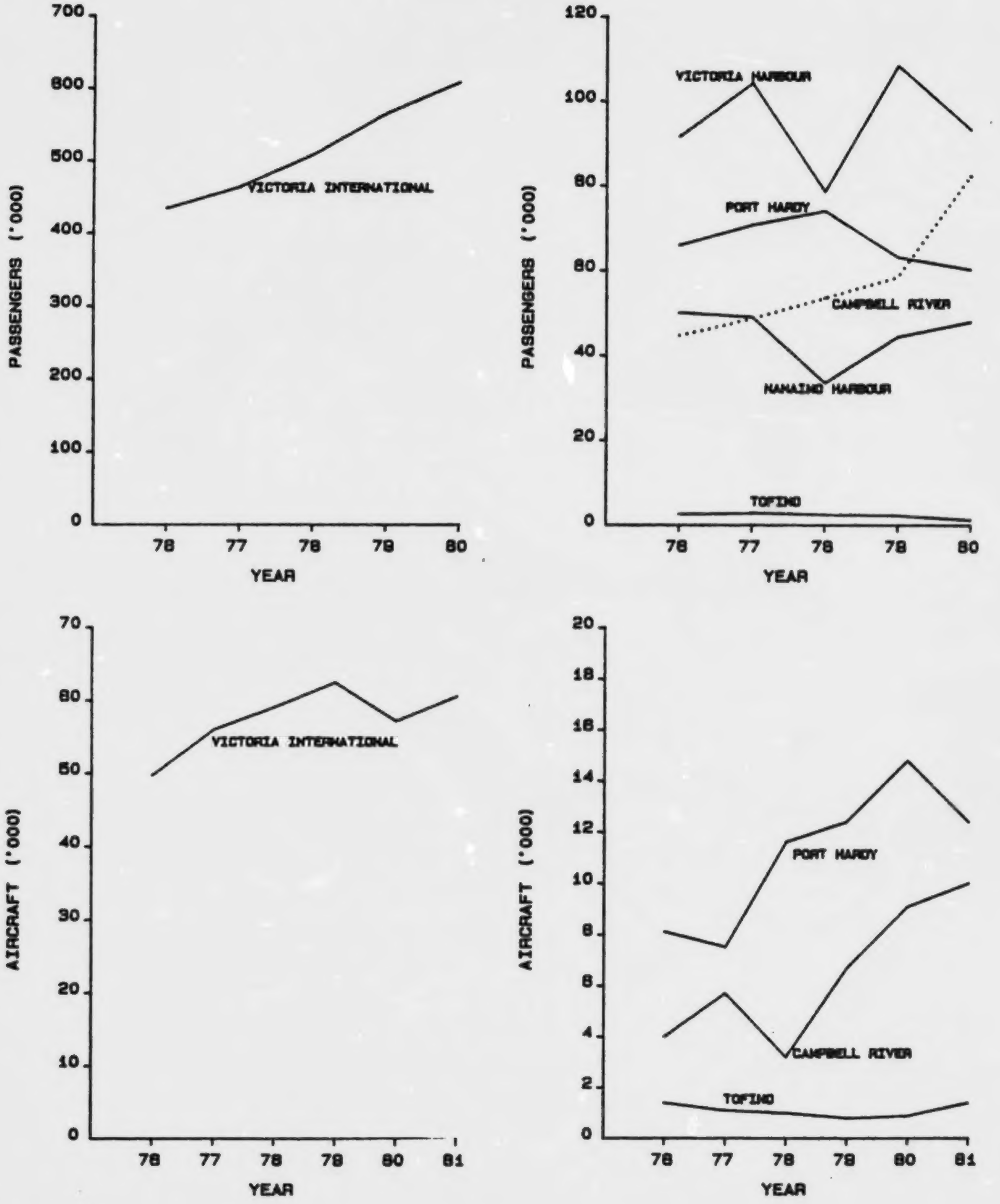
TABLE G-4

1980 PASSENGER STATISTICS
BY AIRPORT
SCHEDULED SERVICES (CLASS 1 & 2) ONLY

Major Airports	
Victoria International	608,200
Campbell River	82,400
Nanaimo (Cassidy)	68,300
Port Hardy	60,300
Comox	40,000
Port Alberni	1,300
Tofino	1,300
Float Plane Bases	
Victoria Harbour	93,300
Nanaimo Harbour	48,600
Duncan	4,400
Tahsis	3,600
Gold River	2,100
Ganges	1,700
Kyuquot	600
Zeballos	500

Source: Enplaned & Deplaned Statistics Statement 37, A.S.C. 1980 (Published, September 1982. Directorate of Statistics & Forecasts (Air).

FIGURE G-1
PASSENGER AND COMMERCIAL AIRCRAFT MOVEMENTS AT VANCOUVER ISLAND AIR FACILITIES
1976 - 1981



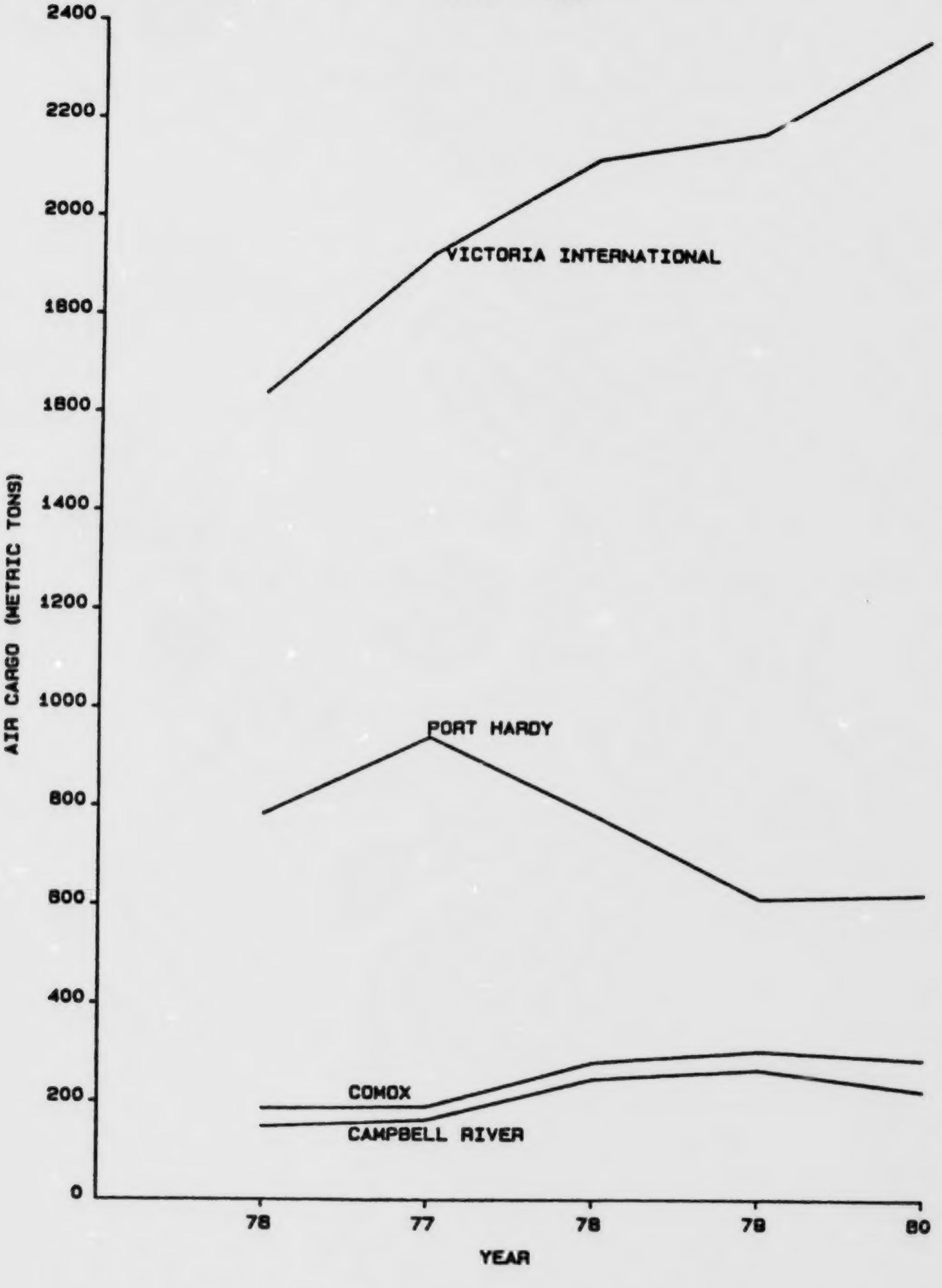
(REFERENCE: APPENDICES G-1 & G-2)

3.0 FREIGHT TRAFFIC

Figure G-2 shows air cargo movements at four of the busier airports on Vancouver Island from 1976 to 1980 (for additional data see the Appendix G-3). Unfortunately, while sub-regional air service is said to be very important to many of the smaller communities on the Island, no freight statistics are available from these small air strips and float plane bases.

As is evident from the graphs in Figure G-2, air cargo traffic has been expanding rapidly (approximately 9.5% per annum) at Victoria International Airport. Similar increases, although not as consistent from year to year, were experienced at Comox and Campbell River. The Port Hardy figures show a decline in cargo traffic since 1977. The reduction in cargo volumes during the last two years at the smaller airports is partly due to a decline in postal traffic. Recently, Canada Post has shifted mail traffic to trucks instead of using air cargo services.

FIGURE G-2
CARGO MOVEMENTS
AT VANCOUVER ISLAND AIRPORTS
1976 - 1980



(REFERENCE: APPENDIX G-3)

4.0 AIR PASSENGER PROJECTIONS

The previous Figure G-1 showed passenger movements at the six busiest air facilities on Vancouver Island for the years from 1976 to 1980. The total increase in passenger carryings during this period represented an annual growth rate of 6.7%, nearly three times the population growth rate of 2.3%. Passenger movements at Victoria International and Campbell River increased the most (at annual rates of 8.8% and 16.5% respectively). The majority of this growth in traffic at Campbell River, however, occurred between 1980 and 1981. Traffic at the other airports tended to fluctuate.

While it is reasonable to expect that air travel will continue to grow beyond the rate of population growth, the growth rates experienced at Victoria International and Campbell River cannot be expected to continue over a long term - certainly not over a 20-year period.

Thus, for the purposes of making projections, it is assumed that air passenger traffic at Victoria International will grow at twice the rate of population growth in the surrounding area. This assumption is generally consistent with the 3.7% rate envisioned for all of B.C. by Transport Canada (Table B-4) which is also roughly twice the projected provincial population growth rate. At the other airports, traffic is assumed to increase at the rate of population growth. It is also assumed that float plane bases will continue to operate and that there will be no significant shift of their traffic to land-based operations. These assumptions lead to the results presented in Table G-5.

TABLE G-5

AIR PASSENGER PROJECTIONS

Airport	Actual 1980	Growth Rate	Projected 1986	Projected 1991	Projected 1996	Projected 2001
Victoria International	608,200	3.2%	734,700	860,000	1,006,700	1,178,500
Campbell River	82,400	3.2	99,500	116,500	136,400	159,700
Nanaimo (Cassidy)	68,300	2.8	80,600	92,500	106,200	122,000
Port Hardy	60,300	2.8	71,200	81,700	93,800	107,700
Comox	40,000	3.1	48,000	56,000	65,200	75,900
Tofino	2,300*	1.1	2,460	2,590	2,740	2,890
Port Alberni	1,300	1.1	1,390	1,470	1,550	1,640
Float Plane Bases						
Victoria Harbour	93,300	1.6	102,600	111,100	120,300	130,200
Nanaimo Harbour	48,600	2.8	57,400	65,900	75,600	86,800
Tahsis	3,600	2.4	4,150	4,670	5,260	5,920
Gold River	2,100	2.4	2,420	2,730	3,070	3,460
Ganges	1,700	2.9	2,020	2,330	2,690	3,100
Kyuquot	600	2.9	710	820	950	1,090
Zeballos	500	2.4	580	650	730	820
Total	1,013,200	3.0	1,207,730	1,398,960	1,621,190	1,879,720

*1979 value

Passenger traffic on and to Vancouver Island is projected to expand from the 1.0 million passengers handled in 1980 to nearly 1.9 million passengers in 2001. The majority (63%) of these will be handled at Victoria International, with its traffic surpassing 1.1 million passengers per annum by the year 2001. Campbell River, Nanaimo (Cassidy) and Port Hardy airports will each surpass 100,000 passengers per annum, while Victoria Harbour and Nanaimo Harbour are projected to handle 130,000 and 87,000 passengers respectively in the year 2001. A considerable expansion of facilities at several of the airports would be required to accommodate these increased traffic levels and whether the projected increases for Victoria Harbour and Nanaimo Harbour would be tolerated is open to some question.

5.0 AIR FREIGHT PROJECTIONS

In the previous Figure G-2, the air freight movements for four of the larger airports on Vancouver Island were shown for the years 1976 to 1980. Total air freight movements grew at an average rate of 6.1% per annum, a figure very close to the growth rate for air passenger traffic during this same period. Air freight growth rates at Comox, Campbell River and Victoria averaged 11.4%, 10.4% and 9.6% respectively, although cargo traffic at both Comox and Campbell River dropped between 1979 and 1980. Freight at Port Hardy declined by an average of 5.6% per annum.

In the previous section it was assumed that air passenger traffic will grow at least at the rate of population growth, with Victoria International growing at twice this rate. An identical assumption would appear appropriate for air freight movements. While the historical growth in freight at Comox might suggest this airport should also be considered for a high growth rate projection, the recent decision of the Federal Government to move one of the Comox-based air defense squadrons to Alberta counter-balances this argument.

It is therefore assumed that air freight traffic at Victoria International will grow at twice the rate of the population growth projected for the surrounding area. At Comox, Campbell River, and Port Hardy, it is assumed that air freight traffic will increase at the rate of population growth. The results of these assumptions are shown in Table G-6. Total air cargo traffic is projected to grow at an average rate of 3.1% from the 3,500 tonnes handled in 1980 to nearly 6,700 tonnes in the year 2001. Over two-thirds of this traffic is projected to be through the Victoria International Airport. In order to accommodate these projected volume increases, it will likely be necessary to make minor modifications to cargo facilities, at several of the airports, particularly Victoria International.

TABLE G-6

AIR FREIGHT PROJECTIONS
(Metric Tonnes)

Airport	Actual 1980	Growth Rate	Projected 1986	1991	1996	2001
Victoria International	2,362	3.2%	2,850	3,340	3,910	4,580
Campbell River	223	3.2	270	320	370	430
Port Hardy	622	2.8	730	840	970	1,110
Comox	287	3.1	340	400	470	540
Total	3,494	3.1%	4,190	4,900	5,720	6,660

6.0 SUMMARY

A total of 54 different air facility locations are available on Vancouver Island, ranging from the large international airport at Victoria to the many harbours and coves having only small float plane wharves and no other facilities. There are 33 air carriers presently licensed to operate out of these various locations but only five hold Class 1 or 2 licenses (i.e. offering fixed schedule air services). Most provide air charter or rental services only.

The majority of scheduled air services connect the eastern coast of Vancouver Island with the Mainland. Very few flights run east-west across the Island or provide services along its western coast. Three-quarters of the total scheduled air route capacity of almost 31,000 seats per week (as of January, 1983) connects with either Vancouver or Vancouver Harbour. Edmonton, Calgary and Seattle are the only out-of-province points having direct connection with Vancouver Island, and these flights are all handled at Victoria International Airport.

In 1980, over 600,000 passengers were handled through Victoria International Airport, by far the busiest airport on Vancouver Island. Campbell River airport and Victoria Harbour each handled about 80,000 passengers while Nanaimo Harbour, and the Port Hardy, Nanaimo, and Comox airports handled between 40,000 and 70,000 passengers each during the year. The remaining locations handled less than 5,000 passengers each.

Total air passenger movements on Vancouver Island grew quite rapidly from 1976 to 1980, at an average rate of 6.7% per annum. The projections prepared during this study suggest that by the year 2001, passenger traffic will reach nearly 1.9

million passengers per annum, up from the 1.0 million handled in 1980. It is projected that most of this traffic (63%) will continue to be handled through Victoria International Airport.

Air cargo traffic at Island facilities has also been increasing rapidly, at an average rate of 9.5% per annum between 1976 and 1980. Cargo projections estimate the annual tonnage handled on the Island in the year 2001 to be 6,700 tonnes as compared with the 1980 figure of 3,500 tonnes. Again, most of this traffic (over two-thirds) will be handled through Victoria International Airport.

H. MARINE

H. MARINE

1.0 MARINE HARBOURS AND FACILITIES

Vancouver Island, with over 2500 km of rugged coastline, is surrounded by literally hundreds of tiny coves, sheltered bays and deep inlets. Many of these are ideally suited for marinas and deep sea harbours. Between Vancouver Island and the Mainland, and between the Island and the network of smaller islands surrounding Vancouver Island, a wide assortment of ferries, barges, freighters and private motor craft are in constant motion, serving economic and recreational demands of the Island's residents. Ever since the early days of the Island's colonization, water transportation has been the life blood which has sustained many of the settlements and provided industrial growth to the Island.

Today, the continuous flow of water traffic is facilitated by a network of ports and harbours, many having complex and sophisticated cargo handling equipment. Map 20 illustrates the location of over 80 public marine facilities around the coastline of the Island. Brief descriptions of the marine facilities available at these ports are provided in Appendices H-1 and H-2. While many of the ports offer little more than a small government wharf, at some of these the annual tonnages can be quite substantial if log shipments from nearby logging camps are included. The communities of Nanaimo, Port Alberni, Victoria, Crofton, Cowichan Bay and Campbell River all have multiple docking facilities for deep sea vessels. Nanaimo, for example, has a total of 7 deep sea berths, Port Alberni has 6 and Victoria has 4.

Table H-1 provides a partial list of the marine carriers serving Vancouver Island, showing the usual types of equipment operated by each. Most carriers provide services in response to demand,

TABLE H-1

LIST OF MARINE CARRIERS

EQUIPMENT SERVING VANCOUVER ISLAND[1]

CARRIER	Tugs	Barges	Ships	Scows	COMMENTS
Bute Towing Division	4			4	
CPR-Coastal Marine Operations	1	1 (Push)	4 (RF)		RF-Roll on/Roll off Ferry
Canadian Transport (M&B)	2	4	8		
Canadian Tugboat Co. Ltd.	3				
Chemainus Towing Co. Ltd.	10				
Continental Explosives Ltd.			1 (F)		F-Freighter
Hodder Tugboat Co. Ltd.	5				
Island Sea Marine Ltd.	2				Limited operation.
Kingcome Navigation Co. Ltd.	5	2 (L) 1 (R)			L-self-propelled log carrier. R-self-propelled rail car carrier.
Lafarge Concrete Ltd.	3				
Lyttle Bros. Ltd.	4				
Ocean Construction Supplies Ltd.	5				
Pacific Towing Services Ltd.	12				
Quatsino Navigation Co. Ltd.	1				
RivTow Straits ltd.	74	39 3 (D)			D-self-dumping.
Seaboard Shipping Company			2	Yes	Number of scows unknown.
Seaspan International Ltd.	46	104 2 (R)			Also Genstar Marine Ltd. R-self-propelled rail car carrier.
Shields Navigation Ltd.	7				
Swiftsure Towing Co.	7				
D.H. Timber Towing	4				
Weldwood Transportation Ltd.	3				

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[1] The equipment listed serves the coast of the Mainland as well as Vancouver Island.

Source: Telephone and personal interviews, December 1982 - March 1983.

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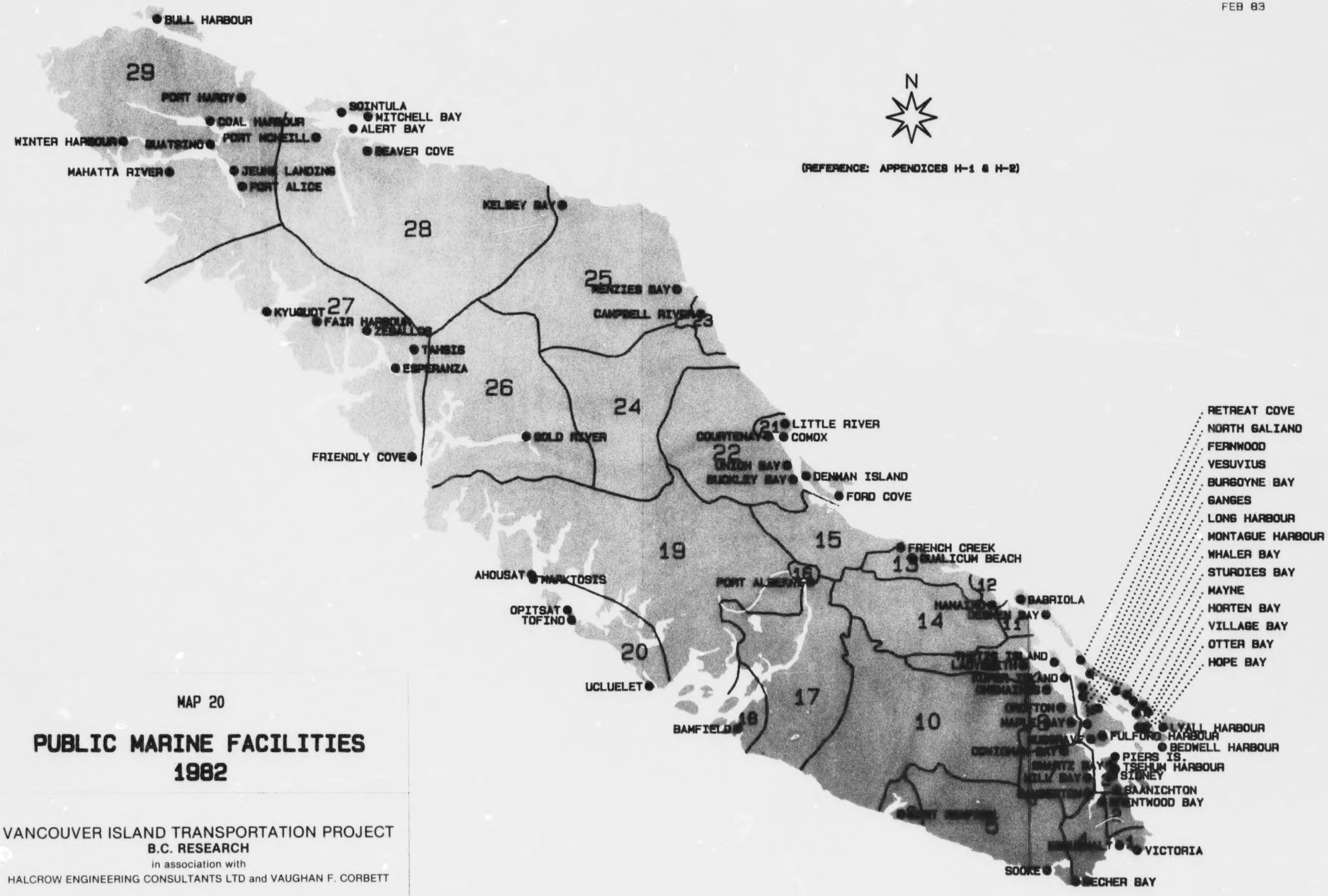
N
(REFERENCE: APPENDICES H-1 & H-2)
BULL HARBOUR
29
PORT HARDY
COAL HARBOUR
PORT McNEILL
WINTER HARBOUR
QUATSINO
MAHATTA RIVER
JEUNE LANDING
PORT ALICE
SOINTULA
MITCHELL BAY
ALERT BAY
BEAVER COVE
KELSEY BAY
28
25
MENZIES BAY
CAMPBELL RIVER
23
KYUQUOT
27
FAIR HARBOUR
ZEBALLOS
TAHSIS
ESPERANZA
26
24
GOLD RIVER
FRIENDLY COVE
21
LITTLE RIVER
COURTENAY
COMOX
22
UNION BAY
BUCKLEY BAY
DENMAN ISLAND
FORD COVE
15
FRENCH CREEK
QUALICUM BEACH
13
19
16
PORT ALBERNI
12
AHOUSAT
MARKTOSIS
OPITSAT
TOFINO
20
UCLUELET
NANAIMO
GABRIOLA
DEGNEN BAY
14
11
THETIS ISLAND
LADYSMITH
KUPER ISLAND
CHEMAINUS
CROFTON
MAPLE BAY
MUSGRAVE
COWICHAN BAY
SWARTZ BAY
MILL BAY
17
10
18
BAMFIELD
PORT RENFREW
5
FULFORD HARBOUR
LYALL HARBOUR
BEDWELL HARBOUR
PIERS IS.
TSEHUM HARBOUR
SIDNEY
SAANICHTON
BRENTWOOD BAY
ESQUIMALT
1
VICTORIA
SOOKE
BECHER BAY
RETREAT COVE
NORTH GALIANO
FERNWOOD
VESUVIUS
BURGOYNE BAY
GANGES
LONG HARBOUR
MONTAGUE HARBOUR
WHALER BAY
STURDIES BAY
MAYNE
HORTEN BAY
VILLAGE BAY
OTTER BAY
HOPE BAY

MAP 20

PUBLIC MARINE FACILITIES
1982

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

i.e. they will call at the ports requested, and will assign their fleets to meet cargo handling demands.

2.0 FREIGHT TRAFFIC

Map 21 illustrates the 1980 tonnages moved through twenty of the larger ports on Vancouver Island. These tonnage figures range from 11,000 metric tonnes at Quatsino at the north end of the Island, to 3.7 million metric tonnes handled at the large deep sea port of Nanaimo. Four "pseudo ports" are also marked on this map. These are "Johnstone Strait", "East Coast Vancouver Island", "West Coast Vancouver Island-North", and "West Coast Vancouver Island-South". These fictitious ports represent the freight movements at the large number of small communities, harbours and log holding grounds in the general vicinity indicated by their names. Table H-2 provides a detailed definition of these pseudo ports.

Figure H-1 shows the 1980 tonnage figures broken down into forest products and non-forest product shipments. From this chart it is seen that there are five major forest product ports on Vancouver Island, each of which handled in excess of one million tonnes of cargo in 1980. These five ports are Crofton, Nanaimo, Beaver Cove, Campbell River and Port Alice. With the exception of Beaver Cove, which is a log sorting area, each of these ports has large forest product mills located at or near their facilities. The four "pseudo ports" also recorded large shipments of forest products, with "East Coast" and "West Coast-North" showing over one million tonnes shipped during 1980.

The ports of Alert Bay, Beaver Cove, Menzies Bay, Ladysmith, Chemainus, Crofton, Cowichan Bay, Sooke, Becher Bay, Esquimalt, Port Alberni and Zeballos, together with the pseudo ports of "Johnstone Strait" and "West Coast-North" handle forest product shipments almost exclusively (over 95%). Crofton recorded the largest volume of forest products, with over 3.1 million tonnes in 1980, including logs.

TABLE H-2

DEFINITION OF 'PSEUDO' PORTS IDENTIFIED IN THE MARINE NETWORK

Johnstone Strait (Apple River, Baker Island, Call Inlet, Churchouse, Cortez Island, Cracroft, Crawford Anchorage, Cutter Creek, D'arcy Point, Discovery Passage, Forward Harbour, Goletas Channel, Gorge Harbour, Hardwicke Island, Havannah Channel, Hoeya Sound, John's Point, Kelsey Bay, Lagoon Cove, Lewis Channel, Mansons)

Eastcoast Vancouver Island South (Burgoyne Bay, Colwood, Earle's Creek, Echo Bay, Echo Cove, Egmont, French Creek, Fullford Harbour, Gabriola Harbour, Ganges Harbour, Georgia Straits, Gibsons Landing, Half Moon Bay, Match Point, Hernando Island, Hornby Island, Lund, Madeira Park, Malaspina Straits, Mayne Island, Narrows Inlet, North West Bay, Otter Bay, Parksville, Pedder Bay, Pender Harbour, Porpoise Bay, Saanichton, Sand Heads, Saturna Island, Savary Island, Sechelt, Silva Bay, Stillwater, Telegraph Cove, Trail Island, Treat Creek, Welcome Pass)

Westcoast Vancouver Island North (Allison Harbour, Bonghey Bay, Bull Harbour, Chamiss Bay, Easy Inlet, Head Bay, Holberg, Jeune Landing, Kashutl Inlet, Kyuquot, McCurdey Creek, Isowwin River, Winter Harbour)

Westcoast Vancouver Island South (Bamfield, Barr Creek, Bedingfield Bay, Conuma River, Esperanza, Green Cove, Hecate Bay, Jordan River, Kildonan, Mooyah Bay, Moyeha Bay, Nootka Sound, Snug Basin, Stewardson Inlet, Toquart Bay)

Source: Statistics Canada, Canadian Ports in International and Coastwise Shipping.

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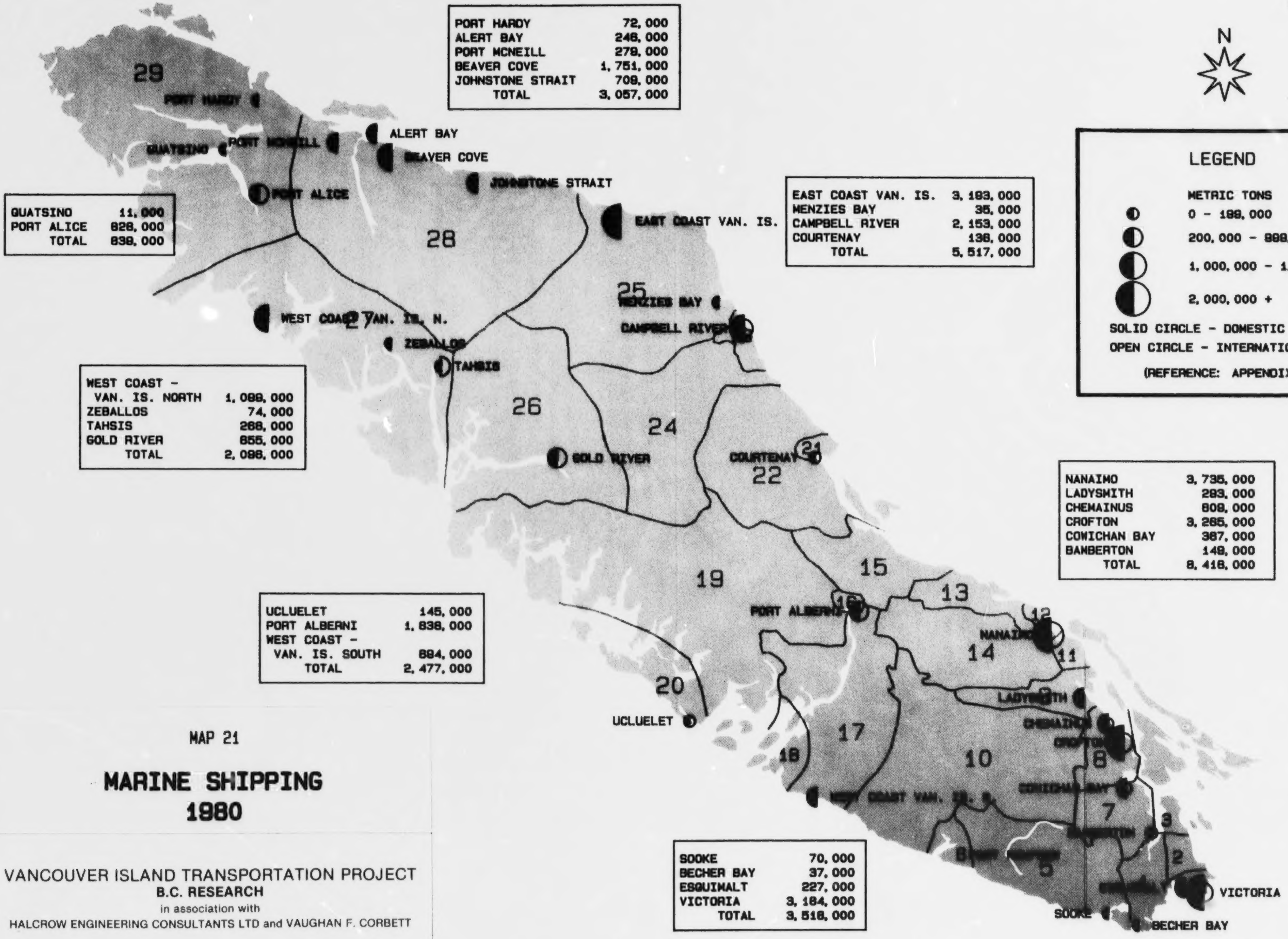

N
29
PORT HARDY
QUATSINO
PORT MCNEILL
ALERT BAY
BEAVER COVE
PORT ALICE
JOHNSTONE STRAIT
28
EAST COAST VAN. IS.
25
MENZIES BAY
CAMPBELL RIVER
WEST COAST VAN. IS. N.
27
ZEBALLOS
TAHSIS
26
24
GOLD RIVER
COURTENAY
21
22
15
19
13
PORT ALBERNI
16
12
NANAIMO
14
11
20
LADYSMITH
9
UCLUELET
CHEMAINUS
CROFTON
17
18
10
8
WEST COAST VAN. IS. S.
COWICHAN BAY
7
3
BAMBERTON
6
5
2
ESQUIMALT
VICTORIA
SOOKE
BECHER BAY

PORT HARDY	72, 000
ALERT BAY	248, 000
PORT MCNEILL	278, 000
BEAVER COVE	1, 751, 000
JOHNSTONE STRAIT	708, 000
TOTAL	3, 057, 000

QUATSINO	11, 000
PORT ALICE	828, 000
TOTAL	839, 000

EAST COAST VAN. IS.	3, 193, 000
MENZIES BAY	35, 000
CAMPBELL RIVER	2, 153, 000
COURTENAY	136, 000
TOTAL	5, 517, 000

WEST COAST - VAN. IS. NORTH	1, 099, 000
ZEBALLOS	74, 000
TAHSIS	268, 000
GOLD RIVER	655, 000
TOTAL	2, 096, 000

NANAIMO	3, 735, 000
LADYSMITH	283, 000
CHEMAINUS	808, 000
CROFTON	3, 265, 000
COWICHAN BAY	387, 000
BAMBERTON	148, 000
TOTAL	8, 418, 000

UCLUELET	145, 000
PORT ALBERNI	1, 838, 000
WEST COAST - VAN. IS. SOUTH	884, 000
TOTAL	2, 477, 000

SOOKE	70, 000
BECHER BAY	37, 000
ESQUIMALT	227, 000
VICTORIA	3, 184, 000
TOTAL	3, 518, 000

LEGEND

	METRIC TONS
◐	0 - 199, 000
◐	200, 000 - 999, 999
◐	1, 000, 000 - 1, 999, 999
◐	2, 000, 000 +

SOLID CIRCLE - DOMESTIC SHIPPING
OPEN CIRCLE - INTERNATIONAL SHIPPING

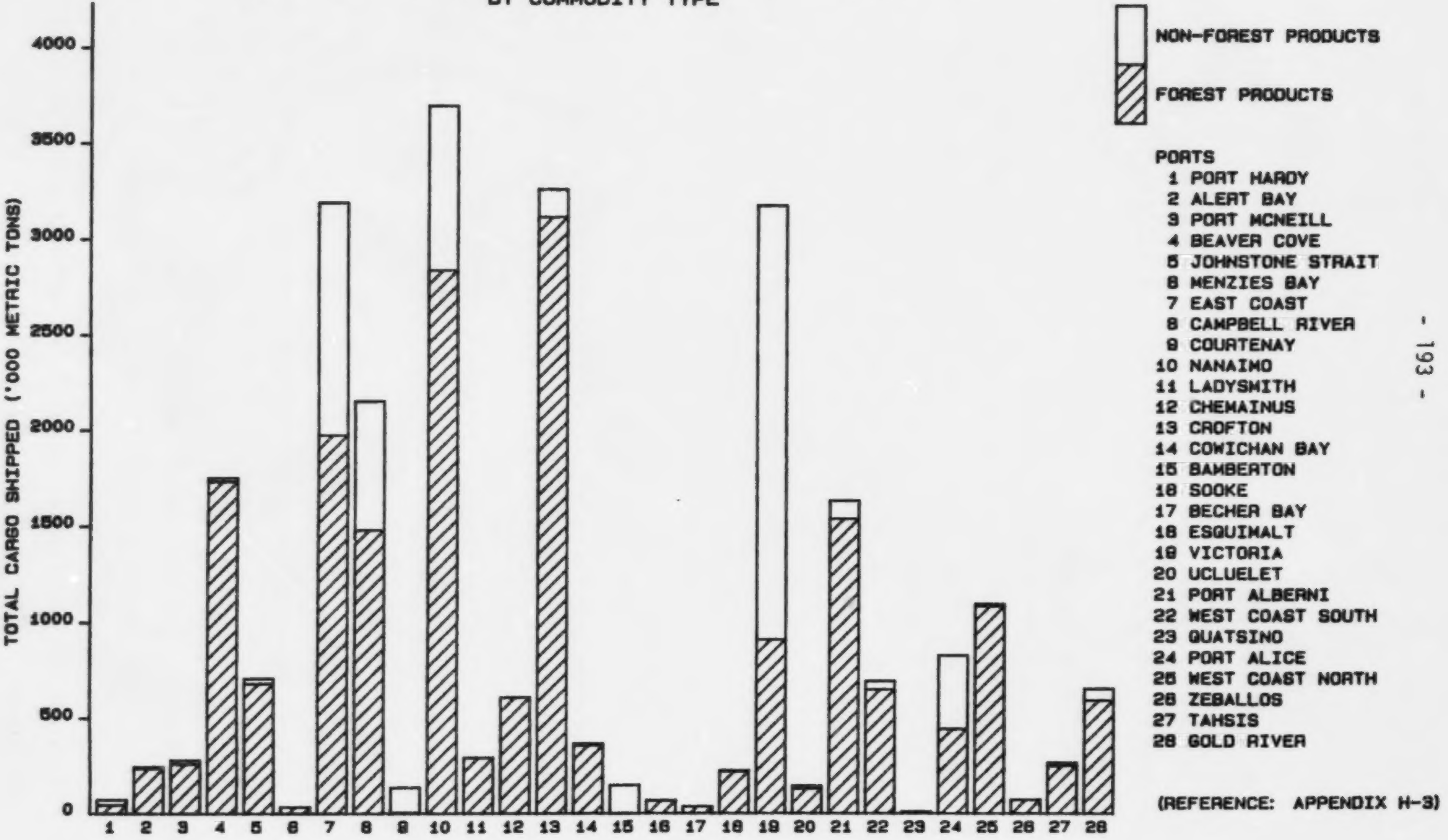
(REFERENCE: APPENDIX H-5)

MAP 21

MARINE SHIPPING
1980

VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

FIGURE H-1
1980 MARINE SHIPMENTS THROUGH VANCOUVER ISLAND PORTS
BY COMMODITY TYPE



(REFERENCE: APPENDIX H-3)

B.C. RESEARCH

In total, 76% of Vancouver Island's marine shipments in 1980 were forest products. These included logs, pulp wood, and finished products such as lumber, plywood, pulp and newsprint. Mining and Construction Materials accounted for 17% while Petroleum products and Consumer Related Goods made up 7% and less than 1% of total marine shipments respectively. The three major ports for non-forest product shipments are Victoria (with over 2 million tonnes), Campbell River and Nanaimo (each with over half a million tonnes shipped). Again the "East Coast" pseudo port showed shipments of over one million tonnes of non-forest products. Additional breakdowns within the non-forest product category are provided in Appendices H-3 and H-4. Victoria, Bamberton, and Courtenay all have over 50% of their volumes in the Mining and Construction Materials category. For Victoria, this is primarily sand and gravel whereas at Bamberton and Courtenay it is mostly cement. Port Hardy and Courtenay have over 20% of their volume in the Petroleum category.

The preceding Map 21 also illustrates the split between domestic and international cargo shipments in 1980 for each of the ports. The major ports for international shipments were Nanaimo (over 1.5 million tonnes), Port Alberni and Victoria (each with over 800,000 tonnes) and Crofton and Campbell River (with over 500,000 tonnes shipped). The main ports for domestic or coast-wise shipments were Crofton, Victoria, Nanaimo and the "East Coast" pseudo port (each with over 2 million tonnes) as well as Beaver Cove, Campbell River and the "West Coast-North" pseudo port (each with over 1 million tonnes). Further breakdowns, showing in and out movements by commodity type at each port are provided in Appendices H-4 and H-5. A total of 77% of the forest product shipments at Vancouver Island ports involved coastal shipping only, with 40% flowing in and 37% flowing out of these ports. For Mining and Construction Materials, 85% of the tonnage was coastal shipping. For Petroleum Products, the comparable figure was 92%.

2.1 Forest Product Shipments

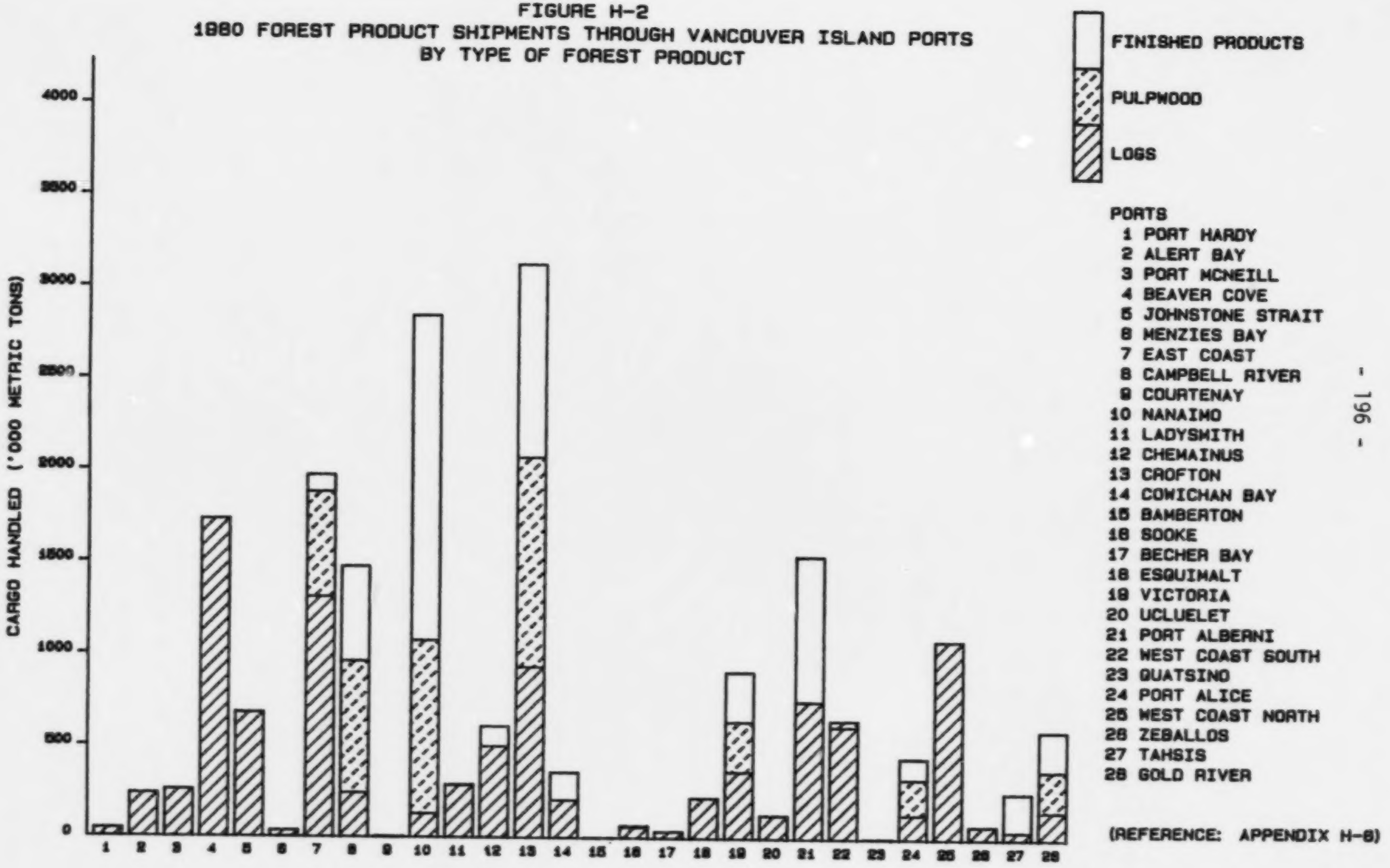
As forest products account for such a large proportion (76%) of total marine shipments at Vancouver Island ports, these are examined in further detail. Map 22 shows the flow of logs and pulpwood around the Island (both clockwise and counter-clockwise), to and from the Island, and in and out of each of the major ports. The statistics quoted on this map represent shipments of logs and pulpwood during 1981, in thousands of metric tonnes.

On Map 22 there are seven large circles marked at various points around the circumference of the Island. Each contain two-way flow arrows and shipping statistics. These figures indicate the total annual flow of logs and pulpwood at these seven points. As is evident from these circles, most of the flow occurs along the eastern coastline, with nearly equal flows in opposite directions in the north-central part of the Island. At the northern end of the Island, there is a net Island-bound flow of logs and pulpwood from the Queen Charlottes, Prince Rupert and Bella Coola.

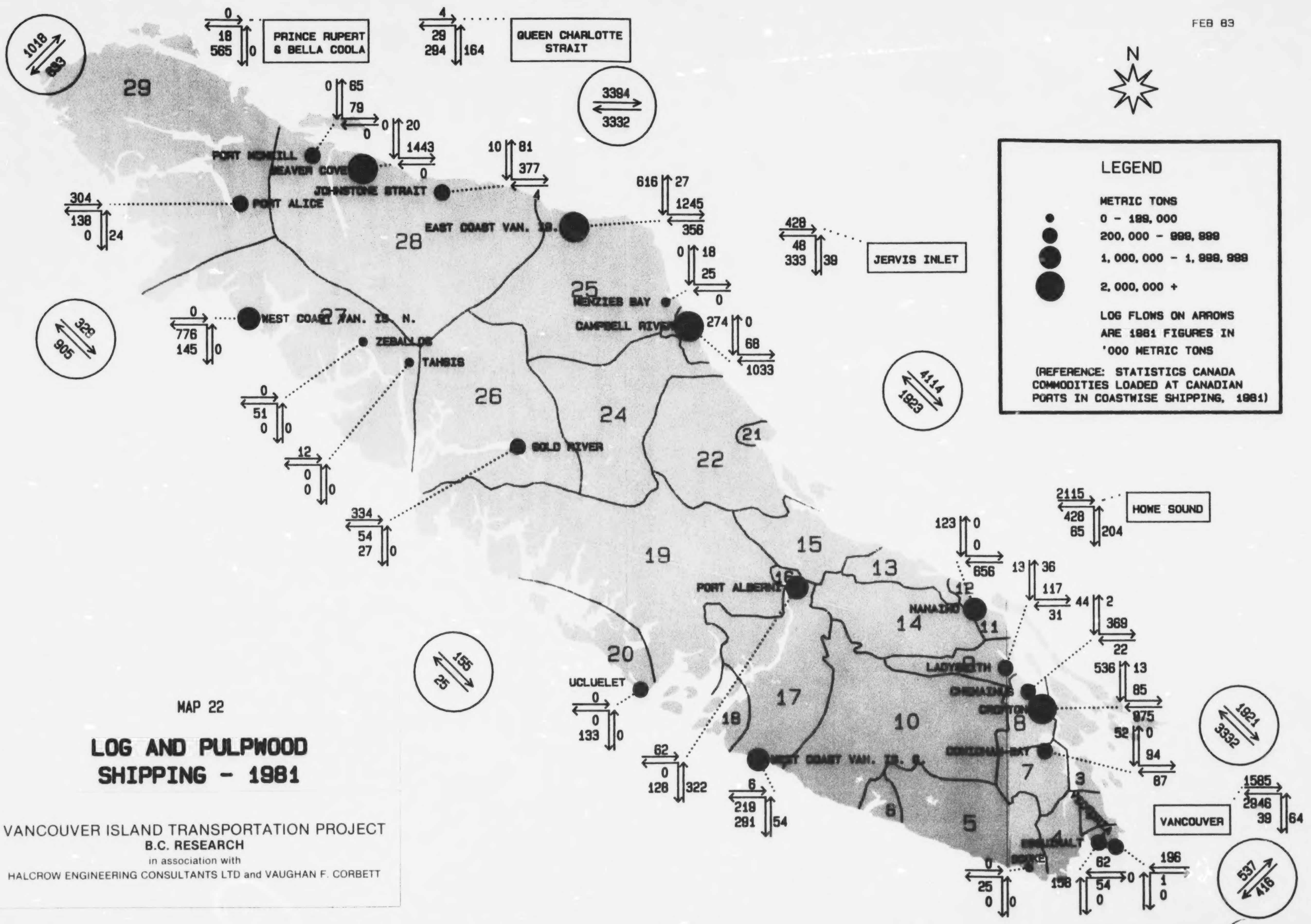
At the southern end of Vancouver Island the largest flow is northward while at the mid-point of the eastern coastline the largest flow is southward. This generally reflects the substantial net flow of logs and pulpwood to the Howe Sound area and the net Island-bound flow from the Vancouver area. Shipments along the south-western coastline are relatively small, but increase toward the northern end of the Island.

Figure H-2 provides a breakdown of forest product shipments in 1980 according to three categories: logs (53% of total forest products), pulp wood (21%) and finished products (26%). Finished products include lumber, plywood, pulp, newsprint, etc.

FIGURE H-2
1980 FOREST PRODUCT SHIPMENTS THROUGH VANCOUVER ISLAND PORTS
BY TYPE OF FOREST PRODUCT



(REFERENCE: APPENDIX H-6)


FEB 83
N
PRINCE RUPERT & BELLA COOLA
0
18
565
0
QUEEN CHARLOTTE STRAIT
4
29
294
164
1018
883
3394
3332
29
0
65
79
0
0
20
1443
0
10
81
377
4
PORT MCNEILL
BEAVER COVE
JOHNSTONE STRAIT
PORT ALICE
304
138
0
24
EAST COAST VAN. IS.
28
616
27
1245
356
428
48
333
39
JERVIS INLET
0
18
25
0
25
MENZIES BAY
CAMPBELL RIVER
274
0
68
1033
328
905
0
776
145
0
WEST COAST VAN. IS. N.
27
ZEBALLOS
TAHSIS
0
51
0
0
12
0
0
0
26
24
4114
1923
21
22
GOLD RIVER
334
54
27
0
19
15
13
16
PORT ALBERNI
2115
428
65
204
HOWE SOUND
123
0
0
656
13
36
117
31
44
2
369
22
12
NANAIMO
14
11
LADYSMITH
9
536
13
85
975
CHEMAINUS
CROFTON
8
52
0
94
87
COWICHAN BAY
7
1921
3332
20
155
25
UCLUELET
0
0
133
0
17
18
10
62
0
128
322
WEST COAST VAN. IS. S.
6
219
291
54
6
5
3
4
1585
2946
39
64
VANCOUVER
ESQUIMALT
SOOKE
0
25
0
0
62
158
54
0
0
196
1
0
537
416
LEGEND
METRIC TONS
● 0 - 199,000
● 200,000 - 999,999
● 1,000,000 - 1,999,999
● 2,000,000 +
LOG FLOWS ON ARROWS ARE 1981 FIGURES IN '000 METRIC TONS
(REFERENCE: STATISTICS CANADA COMMODITIES LOADED AT CANADIAN PORTS IN COASTWISE SHIPPING, 1981)

MAP 22

LOG AND PULPWOOD SHIPPING - 1981

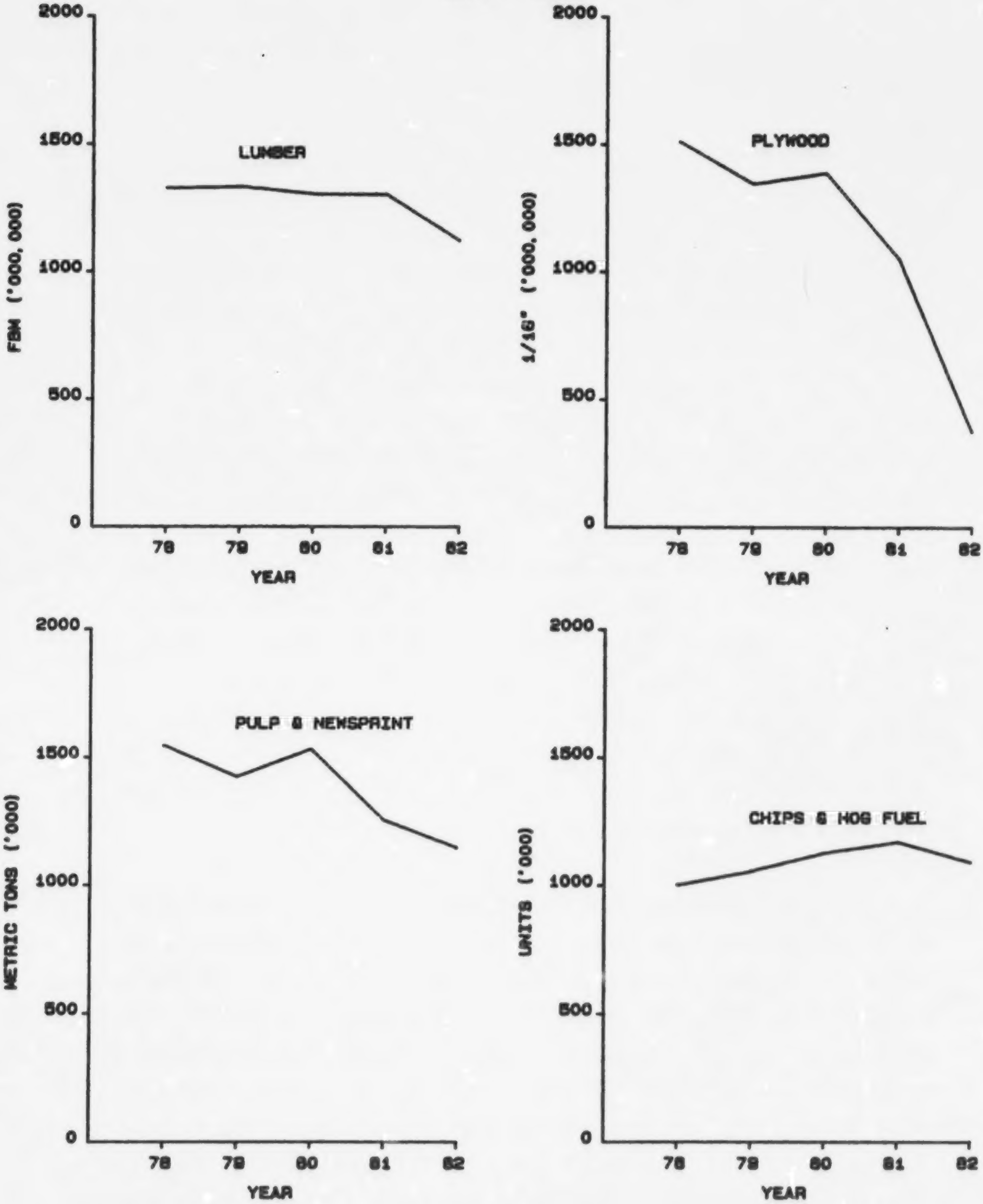
VANCOUVER ISLAND TRANSPORTATION PROJECT
B.C. RESEARCH
in association with
HALCROW ENGINEERING CONSULTANTS LTD and VAUGHAN F. CORBETT

In general, logs are transported by truck from logging camps to "sorting" areas, where they are sorted on land or in the water according to species and size. From the sorting areas, the logs are usually transported to sawmills by tug and barge or by tug and log boom. Only a small percentage are shipped to the mills via truck or rail. Waste material from the sawmills is chipped and then barged to pulp mills for further processing. This material is referred to here as pulp wood. Finished products from the sawmills, pulp mills and plywood plants are usually shipped to market by barge or freighter.

From Figure H-2 it is seen that Beaver Cove (with over 1.7 million tonnes) Crofton and Port Alberni (with more the 750,000 tonnes each) and the pseudo ports of "East Coast" and "West Coast-North" (with more than 1 million tonnes each) had the largest volumes of log shipments in 1980. Significant pulpwood shipments were recorded at Crofton (over one million tonnes), Nanaimo and Campbell River (with over 750,000 tonnes each) and the "East Coast" pseudo port (with over 1 million tonnes). The largest volumes of finished products were handled through Nanaimo (with over 1.7 million tonnes) and Port Alberni (with over 750,000 tonnes). Additional details on forest product shipments are provided in Appendix H-6.

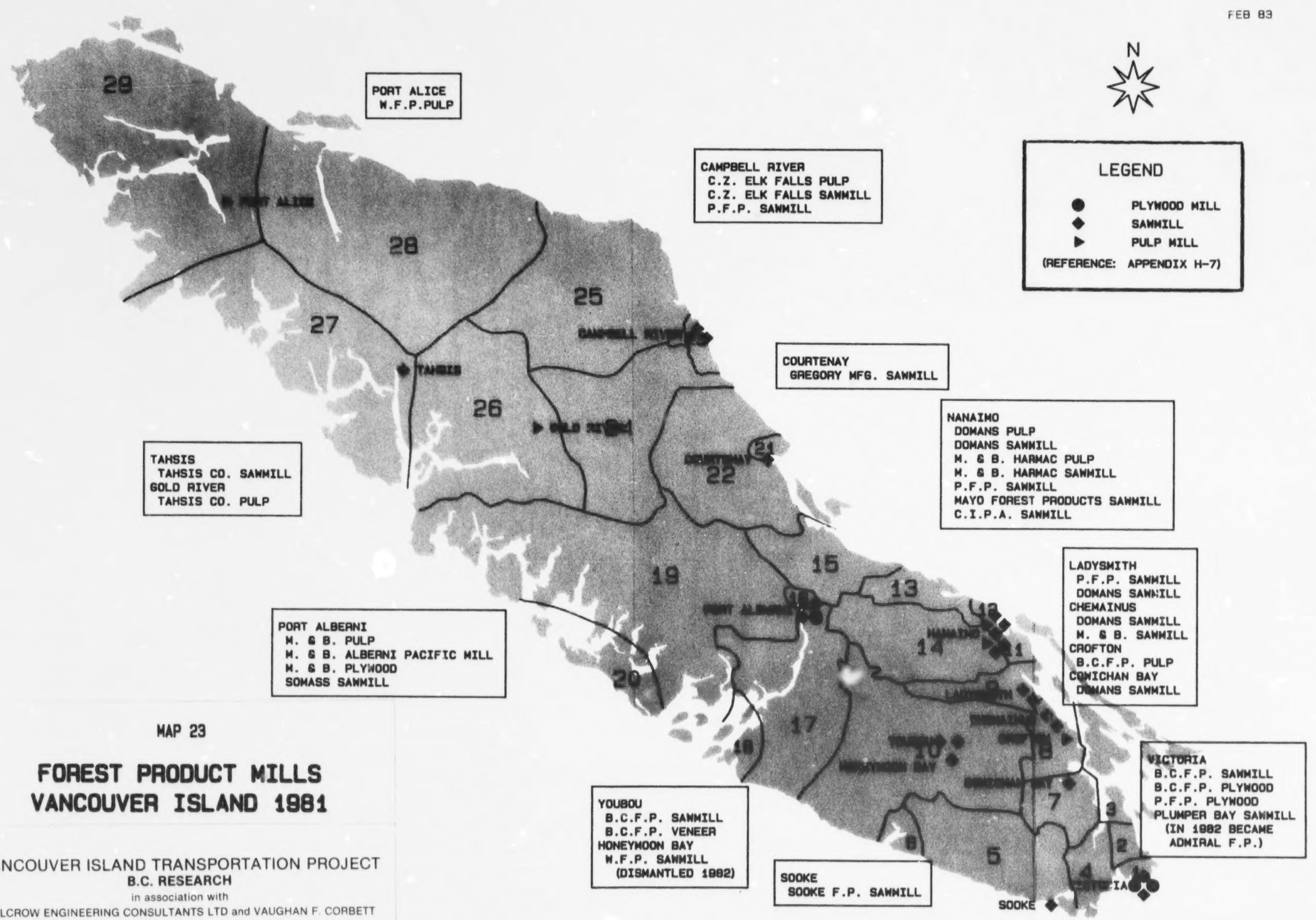
Map 23 illustrates the location of the 32 forest product mills situated on Vancouver Island. As is evident from this map, there is a substantial collection of mills in the Nanaimo, Campbell River, Crofton and Port Alberni areas, accounting for the large marine shipments observed there. In Figure H-3, estimates are provided of the production of Lumber, Plywood, Pulp & Newsprint, and Chips & Hog Fuel from 1978 to 1982. These estimates are based on 24 of the 32 mills, representing roughly 60% of the productive capacity on Vancouver Island. There has been a general decline in production over the past two years because of falling markets. Detailed production estimates are provided in Appendix H-7.

FIGURE H-3
ESTIMATED MILL PRODUCTION
BY TYPE OF PRODUCT
1978 - 1982



FIGURES BASED ON SURVEY OF 24 MILLS REPRESENTING THE FOLLOWING PERCENTAGES OF PRODUCTIVE CAPACITIES:
69% LUMBER, 62% PLYWOOD, 68% PULP AND NEWSPRINT, 43% CHIP AND HOG FUEL

(REFERENCE: APPENDIX H-7)


FEB 83
N
LEGEND
● PLYWOOD MILL
◆ SAWMILL
▶ PULP MILL
(REFERENCE: APPENDIX H-7)
29
28
27
25
26
22
21
19
15
13
12
14
11
20
18
17
10
9
8
7
6
5
4
3
2
1
PORT ALICE
TAHSIS
GOLD RIVER
CAMPBELL RIVER
COURTENAY
PORT ALBERNI
NANAIMO
LADYSMITH
CHEMAINUS
CROFTON
YOUBOU
HONEYMOON BAY
COWICHAN BAY
VICTORIA
SOOKE

PORT ALICE
W.F.P. PULP

CAMPBELL RIVER
C.Z. ELK FALLS PULP
C.Z. ELK FALLS SAWMILL
P.F.P. SAWMILL

COURTENAY
GREGORY MFG. SAWMILL

NANAIMO
DOMANS PULP
DOMANS SAWMILL
M. & B. HARMAC PULP
M. & B. HARMAC SAWMILL
P.F.P. SAWMILL
MAYO FOREST PRODUCTS SAWMILL
C.I.P.A. SAWMILL

TAHSIS
TAHSIS CO. SAWMILL
GOLD RIVER
TAHSIS CO. PULP

LADYSMITH
P.F.P. SAWMILL
DOMANS SAWMILL
CHEMAINUS
DOMANS SAWMILL
M. & B. SAWMILL
CROFTON
B.C.F.P. PULP
COWICHAN BAY
DOMANS SAWMILL

PORT ALBERNI
M. & B. PULP
M. & B. ALBERNI PACIFIC MILL
M. & B. PLYWOOD
SOMASS SAWMILL

VICTORIA
B.C.F.P. SAWMILL
B.C.F.P. PLYWOOD
P.F.P. PLYWOOD
PLUMPER BAY SAWMILL
(IN 1982 BECAME
ADMIRAL F.P.)

YOUBOU
B.C.F.P. SAWMILL
B.C.F.P. VENEER
HONEYMOON BAY
W.F.P. SAWMILL
(DISMANTLED 1982)

SOOKE
SOOKE F.P. SAWMILL

MAP 23

FOREST PRODUCT MILLS
VANCOUVER ISLAND 1981

VANCOUVER ISLAND TRANSPORTATION PROJECT
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2.2 Other Commodity Shipments

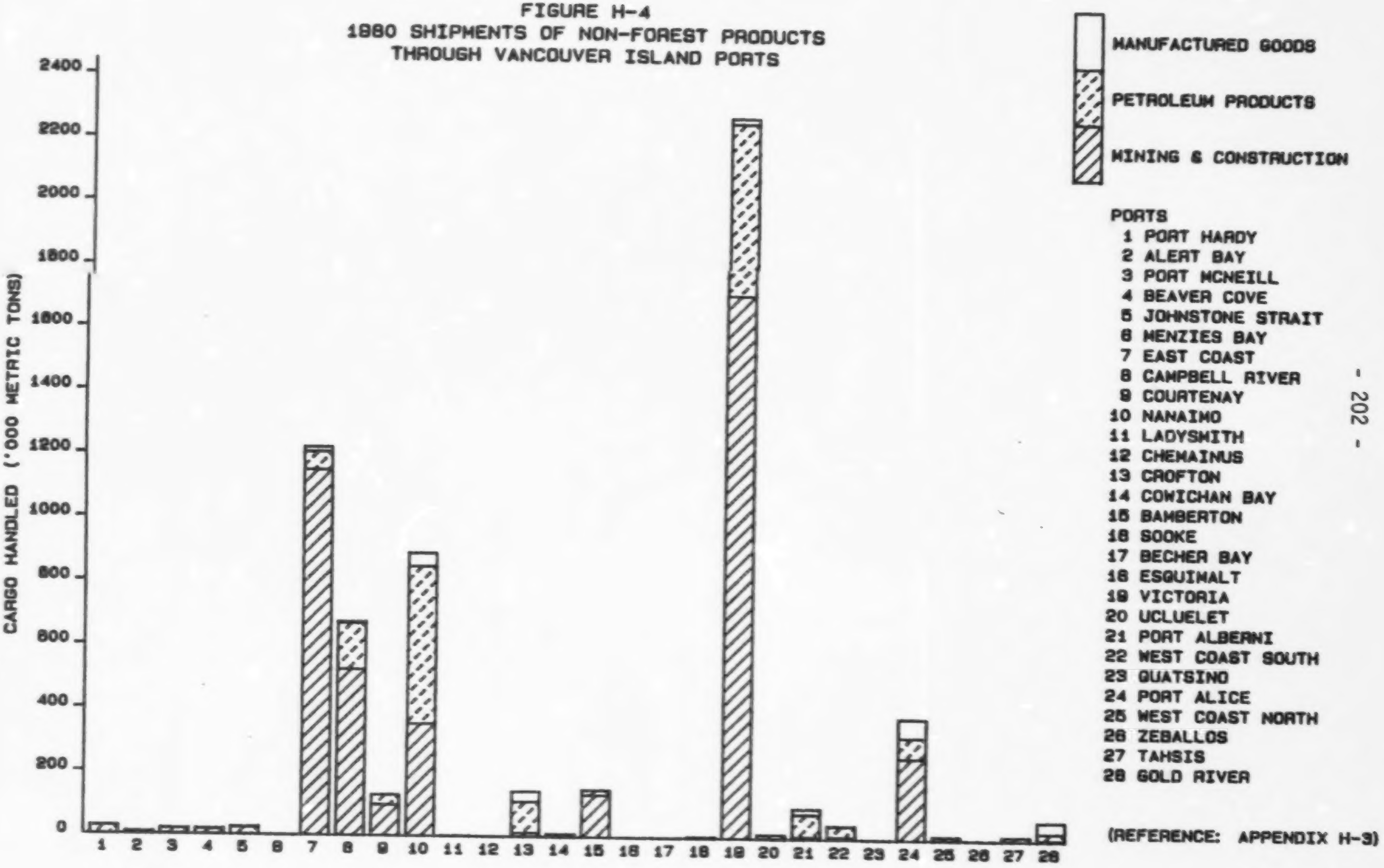
For commodities other than forest products, Figure H-4 shows the shipments of mining and construction materials, petroleum products, and manufactured goods through the major Vancouver Island ports in 1980. Victoria stands out with its large shipments (1.7 million tonnes, mostly outbound) of mining and construction materials (primarily sand and gravel). The East Coast pseudo-port also shipped over a million tonnes (again, made up mostly of sand and gravel), while Campbell River (waste and scrap materials), Nanaimo (stone and salt) and Port Alice (primarily copper concentrates) also recorded significant volumes.

Shipments of petrolum products (mostly Island-bound) were substantial at Victoria and Nanaimo, with approximately one half million tonnes each. Manufactured goods and other products represented small tonnages at all ports. Only Port Alice showed shipments in excess of 50,000 tonnes in this category.

2.3 Small Community Shipments

Many of the smaller communities around the rugged coastline of Vancouver Island do not have year-round access to the road network on the Island. During long periods of the year, potential access is blocked because of rain, mud and snow conditions on the roads. In some cases, the more remote communities do not have road access at all, even during the best times of the year. This is particularly true of small logging camps and Indian villages along portions of the western side of Vancouver Island.

FIGURE H-4
1980 SHIPMENTS OF NON-FOREST PRODUCTS
THROUGH VANCOUVER ISLAND PORTS



(REFERENCE: APPENDIX H-3)

B.C. RESEARCH

For these remote places, and for many of the smaller communities, water transportation services continue to be the prime, if not only, mode of freight movement into and out of each community. These services are frequently provided by tug and barge, although some of the communities are located on one of the coastal freighter sailing routes. While all types of commodities are likely to be included in these shipments, no doubt the in-bound movement of foodstuffs, petroleum products and general merchandise will be predominant.

The annual volume of such shipments is very small by comparison with marine shipments at the major ports around Vancouver Island. Therefore, detailed statistics on such freight movements are not generally available for these smaller communities. However, in the British Columbia Marine Terminal Facilities Study, completed in March, 1982 by the firm of Reid Crowther & Partners Ltd., an attempt was made to estimate the likely levels of marine freight for some of these communities. Table H-3 summarizes these estimates. It is important to note that traffic estimates shown in this table indicate marine oriented movements only (e.g. movements by truck are excluded) and represent general consumption levels by the communities and local industries themselves rather than major imports or exports of industrial commodities. With the exception of the estimate for Sayward/Kelsey Bay, the annual marine freight volumes in Table H-3 are indeed very small.

TABLE H-3

ESTIMATES OF 1981 MARINE FREIGHT SHIPMENTS TO SMALLER COMMUNITIES ON VANCOUVER ISLAND

ANNUAL MARINE FREIGHT VOLUME ESTIMATES (tonnes)

Community	General Merchandise	Food-stuffs	Vehicles	Building Materials	Heavy Equipment	Explo-sives	Petroleum Products	Total
Kyuquot	55	50	-	30	-	-	300	435
Sayward/Kelsey	----------175----------				75	1,255	18,495	20,000
Sointula	----------185----------				-	-	1,665	2,050
Ahousat	475	440	20	265	-	-	2,650	3,850
Bamfield	265	245	10	150	-	-	1,480	2,150
Ganges	-	-	-	-	-	-	2,860	2,860
Port Renfrew	-	-	-	-	-	-	2,860	2,860
Tofino	570	530	25	320	-	-	-	1,445

Source: British Columbia Marine Terminal Facilities Study, Exhibit 3.6.
Reid Crowther & Partners Ltd. March, 1982.

3.0 MARINE FREIGHT PROJECTIONS

In the previous section of this chapter it was indicated that approximately 76% of the marine shipments from and to Vancouver Island involved raw materials and finished products from the forest industry. Thus, the projection of future marine freight traffic will be largely dependent on the outlook for the forest industry. This outlook, as discussed in Chapter B, indicates a mature industry which will probably see little or no further growth over the next two decades.

In preparing projections for each marine port, therefore, the annual growth rate was assumed to be a combination of a zero growth rate for forest product shipments and the population growth rate for non-forest product shipments. The one exception to this general procedure involved the port of Campbell River.

The Quinsam Coal Port Project on Vancouver Island was recently approved at the Stage II level by the Environment and Land Use Committee. Since the project has progressed successfully this far, it appears reasonable to assume that it will continue, at least in some modified form, to the production stage. According to current plans, this would mean approximately one million tonnes of coal shipments each year beginning in 1985, or later if world coal markets remain sluggish. These would be handled through a barge loading facility to be constructed at Middle Bay, a few kilometers north of Campbell River. This additional volume has been added to the port of Campbell River. The resulting growth rate assumptions and projected marine freight volumes are shown in Table H-4.

TABLE H-4

MARINE FREIGHT PROJECTIONS

('000 Metric Tonnes)

Port	Actual 1980	Growth Rate	Projected 1986	Projected 1991	Projected 1996	Projected 2001
Port Hardy	70	1.1	75	80	85	90
Alert Bay	250	0.1	250	250	255	255
Port McNeill	280	0.2	285	285	290	290
Beaver Cove	1,750	0.0	1,750	1,750	1,750	1,750
Johnstone Strait	710	0.1	715	720	720	725
Menzies Bay	40	0.0	40	40	40	40
East Coast	3,190	1.5	3,440	3,700	4,000	4,300
Campbell River	2,150	1.1	3,300	3,430	3,570	3,710
Courtenay	140	3.0	170	190	220	260
Nanaimo	3,370	0.4	3,450	3,520	3,590	3,670
Ladysmith	290	0.0	290	290	290	290
Chemainus	610	0.0	610	610	610	610
Crofton	3,270	0.1	3,290	3,310	3,320	3,340
Cowichan Bay	370	0.1	370	375	375	380
Bamberton	150	0.7	155	160	170	175
Sooke	70	0.0	70	70	70	70
Becher Bay	40	0.0	40	40	40	40
Esquimalt	230	0.0	230	230	230	230
Victoria	3,180	0.9	3,360	3,510	3,670	3,840
Ucluelet	140	0.1	140	140	140	140
Port Alberni	1,640	0.1	1,650	1,660	1,665	1,675
West Coast - South	690	0.1	695	700	700	705
Quatsino	10	1.4	10	10	10	15
Port Alice	830	1.1	890	940	990	1,050
West Coast - North	1,100	0.0	1,100	1,100	1,100	1,100
Zeballos	70	0.0	70	70	70	70
Tahsis	270	0.1	270	270	275	275
Gold River	650	0.2	660	665	670	680
Total	25,560	0.7%	27,375	28,115	28,915	29,775

Total marine shipments are projected to grow quite slowly compared to other transport modes, at an average rate of 0.7% per annum. This is primarily due to the predominance of forest products in the total marine shipments for Vancouver Island and the no-growth assumption used for the forest industry on Vancouver Island beyond 1986. Annual tonnages in the year 2001 are projected to be nearly 30 million tonnes, up from 25.6 million tonnes in 1980. Victoria, Campbell River, Nanaimo and Crofton continue to have the largest volumes, along with the "East Coast" pseudo port. As this growth rate is very modest, it is unlikely that any serious capacity problems would need to be addressed in order to accommodate these increases.

These projections are based on the assumption that all existing ports continue their operations in roughly their current forms. It should be noted that Transport Canada is promoting the consolidation of west coast ports, so that there may be a re-structuring of current port activities over the next decade. Presumably this would not materially affect total marine cargo volumes, but only their routing. For example, Campbell River might grow as a central distribution centre for the northern portion of the Island, thereby handling much of the marine shipments from surrounding areas.

Another factor which would certainly affect future marine shipments is the exploration and development of off-shore oil fields. Both Nanaimo and Port Alberni, in anticipation of off-shore oil activity, are currently in a pre-building phase (i.e. preparing contingency plans in the event that off-shore oil activity does materialize). However, this eventuality has not been incorporated in the projections of Table H-5.

4.0 SUMMARY

Over 80 public marine facilities are available around the coastline of Vancouver Island, ranging from the small cove or inlet with a single government wharf to the large, deep-sea harbours having multiple docking and cargo handling facilities. In 1980, nearly 25.6 million metric tons of freight were shipped through these ports, 76% of this being forest products, 17% mining and construction materials, 7% petroleum products and less than 1% consumer related goods.

The major ports for international shipments were Nanaimo (over 1.5 million tonnes), Port Alberni and Victoria (each with over 0.8 million tonnes) and Crofton and Campbell River (with over 0.5 million tonnes shipped). Of the total 25.6 million tonnes shipped during 1980, only 5.4 million tonnes (21%) was international while the remaining 79% was coast-wise shipping.

The ports of Crofton, Nanaimo, Beaver Cove, Campbell River, and Port Alice were the five largest ports for forest products, each handling over 1 million tonnes in 1980. With the exception of Beaver Cove, which is a large log sorting area, each of these ports has large forest product mills located at or near their facilities. During 1980, 53% of total forest product shipments were logs, 21% pulpwood, and 26% finished products such as lumber, plywood, pulp or newsprint.

For commodities other than forest products, Victoria had the largest volume (including sand, gravel and petroleum products) while Nanaimo (stone, salt and petroleum), Campbell River (waste and scrap materials and petroleum), and Port Alice (copper concentrates) also had significant volumes shipped during 1980.

Many smaller communities on Vancouver Island also rely heavily upon water transportation for the shipment of freight into and out of their areas. Unfortunately, very little data are available on these shipments.

The projections prepared in this study suggest that total marine shipments will grow at an average rate of 0.7% per annum from 25.6 million tonnes in 1980 to nearly 30 million tonnes by the year 2001.

I. SUMMARY AND RECOMMENDATIONS

I. SUMMARY AND RECOMMENDATIONS

1.0 BACKGROUND

In this chapter the principal findings of the project are reviewed for each of the transport modes serving Vancouver Island. Major traffic trends, projected traffic levels, and potential capacity constraints are highlighted. In addition, recommendations are made for improving the collection of information about the Vancouver Island transportation system, for further analyses to produce a better understanding of traffic flows, and for future uses of the data base developed through the current project.

However, before outlining the findings and recommendations, it is important for the reader to understand some of the factors impacting the terms of reference for the study and to consider an overview of the general findings. These two aspects will allow the reader to better focus and weigh the individual transport mode findings and recommendations.

1.1 Scope of Study

This "Traffic Analysis and Forecasts" project has assembled a picture of the present transportation system serving Vancouver Island. Information about traffic flows on, to, and from the Island has been compiled, and base-line traffic projections to the year 2001 have been made. The project was broad in its scope, covering all modes of transport serving Vancouver Island and including both passenger and freight traffic.

Given the breadth of the study and the resources available for the work, data collection was limited largely to existing, reasonably accessible information, and analyses were conducted at a macro-level.

During the course of this project, it was found that suitable data to fully address Vancouver Island transportation were frequently non-existent. Thus, the picture of the transportation system which was assembled had to be based, by necessity, on incomplete data.

The general lack of origin-destination data and comprehensive market information also made the preparation of traffic forecasts a difficult task. The rapidly changing economic climate and the uncertainty surrounding future economic growth patterns for British Columbia presented even larger problems.

Given the limitation of available data sources, a reasonably good picture of the transportation system serving Vancouver Island has been assembled. For each mode, data were compiled to describe the transportation infrastructure, including route systems, major fixed facilities, carriers and services. Traffic data for both passenger and freight movements were assembled and analyzed wherever possible.

Examination of traffic patterns over time clearly shows the impact which economic changes can have on traffic levels. For example, rail traffic has fallen off sharply due to the depressed market for forest products. Ferry traffic levels appear to rise and fall in concert with the health of the tourism industry. Air travel has been hit hard by the current recession, with passenger traffic down substantially.

Because of the uncertainty surrounding the present economic outlook and because of the relatively limited understanding of the factors influencing traffic flows on Vancouver Island, traffic forecasts presented in this report rely heavily upon the expected population growth on Vancouver Island and upon the general outlook for the forest industry. Since there is a general concensus that the forest industry on Vancouver Island is a "mature" industry, one which is unlikely to grow any further, it was assumed that it would recover from its current depressed state, attaining 1980 levels of activity by 1986, and then remain at those levels for the balance of the forecast period. Traffic related to the forest industry was projected to follow this pattern. All other traffic was projected to grow in proportion to the population in the areas served.

The projections assume that no major changes will occur over the next two decades in the factors affecting the various transportation systems. Thus, for example, they assume that the E & N Railway will continue to operate throughout the forecast period, that there will be no significant shifts of passengers or freight from one mode to another, and that no major technological developments will occur which might introduce new or make obsolete existing transportation services.

The traffic projections made in this report should, therefore, be considered as "base-line" forecasts. As other economic scenarios become apparent in the future, their potential impact on traffic levels will have to be assessed. The base-line projections presented here will provide the basis for comparing and evaluating such alternative scenarios.

1.2 Overview of Study Findings

Six modes of transportation on Vancouver Island were examined during this project. They included automobiles, ferries, commercial vehicles (buses and trucks), railways, air carriers, and marine carriers.

The study findings clearly indicate that highway and ferry services are the two elements of the transportation system most likely to require significant attention over the next 15 to 20 years. Projections of automobile and truck traffic on the highways and of vehicle and passenger traffic on the ferries suggest capacity constraints and likely congestion problems at a number of locations. Steps should be taken to examine these potential problem areas in detail and to improve the data necessary for making plans and decisions about them. Specific recommendations are made later in this chapter.

Other elements of the Vancouver Island transportation system are not as likely to face serious capacity problems over the next two decades. Rail traffic and marine traffic projections suggest that continued maintenance of existing facilities will accommodate expected traffic volumes. Future bus passenger volumes can likely be handled by schedule adjustments and small additions to vehicle fleets. Projected volumes of air traffic may require expansion and upgrading of passenger terminal facilities, but only at a small number of sites.

In general, public sector carriers such as VIA Rail Canada Ltd., Pacific Coach Lines Limited, and the B.C. Ferry Corporation, appear to have too limited an understanding of their passenger markets for the purposes of long term planning. During periods of steady traffic growth, this lack of knowledge may not pose serious problems. However, with the economic pressures now facing all such carriers and the possible need to restructure operations or revise development plans, the importance of market understanding has become critical. Carriers should be encouraged to develop more complete measures of the markets which they serve. Recommendations are also made in this regard.

2.0 STUDY FINDINGS BY TRANSPORT MODE

2.1 Automobile

The existing road network on Vancouver Island carries hundreds of thousands of vehicles each day. The main highway corridors run from Victoria northwest to Campbell River and from Victoria northeast to the ferry terminal at Swartz Bay. Traffic levels range from 30,000 to over 60,000 vehicles per day on highway links in the Greater Victoria area and from 6,000 to 18,000 vehicles per day on the sections of highway between Victoria and Campbell River. Most other links have traffic levels of 1,000 to 2,000 vehicles per day. Off-Island residents account for approximately 10% of all trips made on the highway network during the summer.

Average daily traffic during the summer has shown a steady increase during the 1977 to 1981 period on major routes in the Victoria area, on Highways 1 and 17, and on Highway 19 up to the Courtenay area. North of Courtenay, Highway 19 has experienced a significant drop in traffic between 1980 and 1981. Routes serving communities in the centre, the north and the west coast of the Island have shown little or no growth in average summer traffic over the past few years.

Projected traffic levels for the year 2001 represent an increase of 30% to 80% over 1980 levels depending on the particular highway link. In terms of the number of additional car trips on the road during the summer, the largest increases are expected on the following routes:

	Additional Cars/Day	
Route Segment	Numerical Increase Over 1980	Percentage Increase Over 1980
Victoria Area		
· Victoria (downtown) to Juncion 17 and 1 *	43,000	25%
Highway 17		
· Junction 17 and 1 to Saanich *	40,000	25%
· Saanich to Sidney	15,000	50%
Highway 14		
· Junction 1 and 14 to Collwood *	24,000	50%
Highway 1		
· 1 and 1A Corridor from Highway 17 to 14 *	30,000	50%
· Ladysmith to Cassidy	8,500	60%
· Cassidy to Nanaimo	10,000	70%
Highway 19		
· Nanaimo to Parksville	11,000	75%

* These estimates cover traffic in the general corridor between the two indicated end points and are not for single highway links.

These large projected traffic increases are likely to cause congestion problems on several sections of highway. Unstable traffic conditions and low levels of service during peak traffic periods will probably result. Other sections of highway which are already operating near design capacity may also experience congestion problems even though the projected traffic increases are much smaller on these roads. A comparison of current road capacity estimates with projected traffic levels for the year 2001 suggests that the following areas are likely to experience congestion:

Highway 14

- Goldstream to Sooke

Highway 1

- 1 and 1A Corridor from Highway 17 to 14
  (ie. the east-west corridor through
  metropolitan Victoria)
- Goldstream to Duncan
- Junction 1 and 18 (near Chemainus) to Nanaimo

Highway 19

- Nanaimo to Qualicum Beach
- Courtenay to Campbell River

Highway 17

- Victoria (downtown) to Junction 1 and 17
  (ie. the north-south corridor through
  metropolitan Victoria)

The computerized process used in this study dealt only with automobile trips between zones. Intra-zonal traffic, which has its origin and destination within the same zone, was accounted for by separate analyses of the available traffic data for each of the major communities on Vancouver Island except Victoria. Future traffic volumes within these communities were projected in line with their projected increase in population. The highest percentage increase in traffic within a major community is forecast for Campbell River (100% growth by the year 2001) and the largest numerical increase in traffic is projected for the downtown Nanaimo area (74,000 vehicles/day in summer 2001 compared to 40,000 in 1980).

2.2 Ferry

Twenty-six ferry routes serve Vancouver Island and the many smaller islands around its circumference. These ferries range from small coastal freighters providing only cargo services to the large "super ferries" carrying over 350 cars and 1,400 passengers on each trip. Services to the B.C. Mainland include routes to Tsawwassen, Horseshoe Bay, Prince Rupert and Powell River. Services to the U.S. include connections with the San Juan Islands, Anacortes, Seattle and Port Angeles.

The two main routes from Swartz Bay (near Victoria) to Tsawwassen and from Departure Bay (near Nanaimo) to Horseshoe Bay each carry about 6,000 vehicles per day and 18,000 passengers per day during the summer months. This is over 10 times the volume on most other routes. Taken together, these two routes account for over 60% of the total ferry traffic serving Vancouver Island.

On all ferry routes there are substantial traffic peaks during the summer months, August being the highest. Three of the international routes, Victoria to Port Angeles, Victoria to Seattle, and Sidney to Anacortes, have over ten times as much traffic during the summer months as during the winter months. Routes such as Chemainus to Thetis/Kuper Island, Nanaimo to Gabriola Island, and Port McNeill to Alert Bay tend to reflect more even traffic patterns throughout the year. On these routes, the monthly summer volumes are only 1.5 times the January volume. The remaining routes all fall between these extremes.

All routes, except Victoria to Port Angeles and Comox to Powell River, have experienced growth in vehicle and passenger traffic volumes between 1975 and 1981. While most routes showed sharp declines in 1976, due to the general tariff increases introduced that year, in nearly all cases the loss of traffic was recovered by 1978. Growth has continued since then, and most of the annual growth rates from 1975 to 1981 averaged in excess of 3%, with many over 6%, far exceeding the population growth rates in areas served by each ferry route.

Ferry traffic projections for Vancouver Island suggest that total vehicle traffic will grow at an average rate of 2.8% per annum and passenger traffic at 2.2% per annum. Total carryings in the year 2001 will thus reach 34,200 vehicles per day (up from 19,600 in 1981) and 93,500 passengers per day (up from 60,000 in 1981).

These projections represent a substantial increase in traffic loads on the ferries. Modification to sailing schedules, vessel capacities and terminal facilities will likely be necessary in order to cope with this anticipated demand. A comparison of projected traffic on each route in the year 2001 with current vessel capacities and sailing schedules suggests that the following routes are likely to encounter capacity problems within the next 20 years:

Major Vehicle Capacity Increases Indicated:

Nanaimo to Gabriola Island
Buckley Bay to Denman Island
Campbell River to Quadra island
Port McNeill to Alert Bay
Hornby Island to Denman Island

Minor Vehicle Capacity Increases Indicated:

Nanaimo to Horseshoe Bay
Comox to Powell River
Brentwood Bay to Mill Bay
Swartz Bay to Outer Gulf Island
Cortes Island to Quadra Island

Major Passenger Capacity Increases Indicated:

Port Hardy to Prince Rupert
Port McNeill to Alert Bay

Minor Passenger Capacity Increases Indicated:

Victoria to Port Angeles
French Creek to Lasqueti Island
Campbell River to Quadra Island

These observations are based on a relatively superficial comparison of projected traffic levels against current route capacities. Decisions on changes for individual routes would require much further detailed analysis of vessel, terminal and route characteristics.

Ferry traffic volumes appear to be highly dependent on service and pricing characteristics of the routes. Volumes on some routes have climbed dramatically as additional vessel and terminal capacities have been added. In contrast, all route volumes dropped following the general tariff increase introduced in 1976.

Thus, future traffic levels may be determined to a great extent by the pricing and servicing policies and strategies adopted by the ferry route operators. The projections reported here assume that there will be no changes during the forecast period in the overall standards of service or in the pricing policies on these ferry routes.

2.3 Commercial Vehicle

Buses

Inter-urban bus services are available in most communities with a population of 1,500 or more on Vancouver Island. These services are provided by Pacific Coach Lines (PCL) and, in the case of Port Alberni to Ucluelet/Tofino, by Orient Stage Lines (OSL). The municipalities of Chemainus, Comox, and Cumberland, while not directly on an inter-urban bus route, are located just off main highways along which inter-urban buses operate. The only communities which are neither near main routes nor linked to them by local transit services are Lake Cowichan, Youbou, Tahsis, and Port Alice. According to PCL, these communities do not have sufficient traffic demands to justify inter-urban bus connections.

PCL services are generally demand responsive, with additional vehicles being readily added to scheduled departures whenever traffic warrants increased capacities.

Bus passenger volumes demonstrate a pronounced seasonal pattern. There is a high summer peak, a rise in volumes in December, and a smaller rise in volumes in March/April. These high points reflect travel patterns during summer vacations, Christmas and Easter holidays.

During the period 1979 to 1982, average daily bus patronage has generally declined on the two main ferry routes. For other routes on the Island, bus patronage has generally remained fairly stable or fluctuated about an average value, with no real upward or downward trend evident. The main exception to this is the Nanaimo to Port Alberni route where bus traffic has declined substantially in response to reduced activity in the forest industry.

Bus passenger projections prepared during this study suggest that traffic levels will grow at an average rate of 3% per annum, reaching 9,300 passengers per day by the year 2001. By comparison, the 1980 level was 5,300 passengers per day. Most of this increase is expected to occur on the two bus routes using the ferries to the B.C. Lower Mainland.

With the exception of the ferry route services, projected bus traffic increases are not likely to pose capacity problems for the operating companies beyond modest expansion of their existing fleets. However, the additional passengers projected for the two ferry route services represent sizable increases over present levels. Expansions of both fleet and terminal facilities may well be required in order to accommodate this future demand - PCL is already considering this.

Trucks

Commercial trucks constitute a relatively small percentage of the total traffic on the roads and highways of Vancouver Island, usually between 1% and 4% depending on the particular highway link. While the actual volume of trucks is small relative to automobile traffic, each truck has an impact on road capacity of something like 10 car equivalents. Thus, small volumes of truck traffic can cause significant congestion problems.

Highway links in the Greater Victoria area have the highest incidence of truck traffic, approximately 600 to 1,400 trucks per day, depending on the particular highway link. Along the main Island highway between Victoria and Campbell River, truck volumes are typically in the range of 100 to 500 trucks per day.

C.P. Marine provides a regular, scheduled "drop trailer" ferry service to and from Vancouver Island, moving trailers between Vancouver and Swartz Bay and between Vancouver and Nanaimo. C.N. Rail provides a similar service (although much smaller) between Tilbury Island (Vancouver) and Ogden Point (Victoria). These three routes carried an annual average of 100, 160 and 5 trailers per day respectively in 1980 (total movements, both directions). The B.C. Ferry Corporation provides scheduled "roll-on/roll-off" ferry services for trucks to the B.C. Mainland Island at three locations, Swartz Bay, Nanaimo, and Port Hardy. The Ministry of Transportation and Highways operates the service between Comox and Powell River. These four routes had average daily truck traffic in 1980 of 209, 207, 2 and 13 trucks per day respectively.

A substantial proportion of the truck traffic on the Vancouver Island highway system is associated with the forest industry. These trucks are travelling primarily between Island logging camps and Island mills or between Island mills and Island dock facilities. Less than 10% of the truck trips related to the forest industry are destined for the ferry services.

The truck trips destined for off-Island locations and those associated with the forest industry account for only a portion of truck traffic. The majority of truck traffic must be considered as local activity, particularly in the Victoria area and along the Victoria to Nanaimo corridor.

In the course of the forecasting work, this study looked beyond the main highway network to see whether potential new links might gain in importance over the 20-year forecast period. Secondary roads and routes currently serving as logging roads or access to remote recreational areas were included in the overall highway network used for the study.

The growth of truck traffic compared to the projected automobile traffic differs on many links. This changing mix of traffic will have an important bearing on the planning and design work for these routes. Accordingly, this study identified several "highway links" for which the anticipated number of trucks in the year 2001 will exceed either 5% or 10% of the projected automobile traffic. It is likely that these sections of highway will require more detailed study to ascertain whether road improvements will be necessary to accommodate the future traffic without undue congestion:

Truck Traffic is Projected to be More Than 10% of Auto Traffic:

- Campbell River - Highway 28 (Strathcona Rural)
- Woss - Gold River
- Lake Cowichan - Bamfield
- Bamfield - Nitinat
- Highway 28 (Strathcona Rural) - Gold River
- Gold river - Tahsis

Truck Traffic is Projected to be More Than 5% of Auto Traffic

- Junction Highway 14 and 1 - Goldstream Park
- Cassidy - Nanaimo (Rural)
- Courtenay - Campbell River
- Campbell River - Highway 19 (Sayward)
- Highway 19 (Sayward) - Woss
- Sooke - Port Renfrew

2.4 Rail

There are only two public rail lines serving Vancouver Island: the CPR operating on the E & N rail line between Victoria and Courtenay, with ancillary lines to Lake Cowichan and Port Alberni and also providing connecting rail-barge services from Nanaimo to Vancouver; and the CNR which operates a small section of track in Victoria, a line running from Cowichan Bay inland to Youbou, and rail-barge services from several Island locations to Tilbury Island in Vancouver.

VIA Rail provides passenger services along the E & N line from Victoria to Courtenay (one trip each way, daily), using two refurbished Rail Diesel Cars. In 1979, the total number of passengers carried during the year on the E & N rail line reached a peak of 54,900 (27,900 passengers northbound and 27,200 southbound). Patronage has fallen since then and in 1981 totalled only 42,700. Analysis of ticket sales for the summer of 1982 showed that 40% of the passengers boarding at Victoria and 66% of the passengers boarding at Courtenay held tickets for the entire one-way journey (ie. did not disembark at some mid-route station). The maximum number of passengers on the train at any one time occurred in the area of the Malahat Pass and represented approximately 80% of the total number of passengers handled along the entire route. Ridership is distinctly seasonal, with northbound traffic reaching higher peak levels than southbound traffic.

Under the assumption that appropriate marketing and service strategies can be used to rebuild and maintain 1981 levels of ridership and market share, rail passenger traffic is projected to grow at an average rate of 2.1% per annum from the 42,700 passengers handled in 1981 to approximately 64,000 passengers per year in 2001. The capacity of the existing two Rail Diesel Cars and other rail infrastructure are sufficient to accommodate these projected traffic levels although there would be some congestion during summer weekends due to traffic peaking at these times.

Rail freight traffic has steadily declined in all areas of the network except for the very low volume Courtenay to Parksville C.P. Rail segment. These declines have been caused partly by a shift from rail to truck transport and partly by the depressed markets for forest products. Even in 1981, with the forest industry already in decline, approximately 50% of the freight on C.P. Rail and C.N. Rail was forest products. The balance of the C.P. Rail freight car movements in 1981 were mining and construction materials (19%), consumer related products such as wheat and grain (15%) and manufactured goods (17%). The remaining C.N. Rail freight movements were mostly manufactured goods (41%).

Rail freight projections suggest that growth will be slow for this mode. By the year 2001, traffic levels on the C.P. Rail barge service are projected to be 17,700 cars per year (as compared to 15,000 in 1980) and on the C.N. Rail barge service, 6,100 cars per year (as compared to 5,400 in 1980). These projected traffic levels do not exceed the current capacity of the rail network, provided that the existing lines are maintained at present standards.

2.5 Air

While there are some 54 different air facility locations available on Vancouver Island, most are simply grass air strips or float plane wharves in small harbours and coves. Only 14 locations provide scheduled air passenger services, with a total scheduled air route capacity of 31,000 seats per week as of January, 1983. Three-quarters of this capacity connects with Vancouver or Vancouver Harbour. The only direct flights to out-of-province destinations are to Edmonton, Calgary and Seattle. The largest airport is Victoria International, which handled over 600,000 passengers during 1980. Campbell River airport and Victoria Harbour each handled about 80,000 passengers in 1980, while Nanaimo Harbour, and the Port Hardy, Nanaimo, and Comox airports each handled between 40,000 and 70,000.

There has been a consistent and rapid increase in air passenger traffic (8.8% growth per annum) at Victoria International Airport from 1976 to 1981. Traffic volumes at other airports have been more erratic. There has been increased passenger traffic at Campbell River and Victoria Harbour and nominal declines at Nanaimo Harbour, Port Hardy and Tofino. The total increase in air passenger carryings during this period represents an annual growth rate of 6.7%, nearly three times the population growth rate of 2.3%.

Air passenger traffic is projected to grow at an average rate of 3.0% per annum, reaching nearly 1.9 million passengers in 2001, up from the 1.0 million in 1980. Most of this traffic (63%) is expected to be handled through Victoria International Airport. Expansion of facilities at several airports would be required to accommodate this increased traffic. Whether the increases projected for Victoria Harbour and Nanaimo Harbour would be tolerated by the public is open to some question.

Air cargo traffic has been expanding rapidly (9.5% growth per annum) at Victoria International Airport. Similar increases, although not as consistent from year to year, were experienced at Comox and Campbell River. Port Hardy figures show a decline in cargo traffic since 1977.

Air cargo traffic is currently at a level of about 3,500 tonnes per year. By the year 2001 it is expected to be 6,700 tonnes, with most of this being handled through Victoria International Airport. In order to accommodate this projected volume increase, it will probably be necessary to make minor modifications to cargo facilities at several airports, particularly Victoria International.

2.6 Marine

Vancouver Island is surrounded by hundreds of coves and inlets, many of which offer excellent locations for marine harbours. Over 80 public marine facilities are available, ranging from small coves with single government wharves to large harbours having multiple deep sea berths and sophisticated cargo handling equipment.

In 1980, nearly 25.6 million tonnes of freight were shipped through Vancouver Island ports. Twenty-one percent were international shipments, with Nanaimo, Port Alberni, Victoria, Crofton and Campbell River handling the majority. The main ports for domestic or coast-wise shipments were Crofton, Victoria, Nanaimo, Beaver Cove, and Campbell River.

Forest products made up 76% of all marine shipments in 1980 (19.7 million tonnes). During that year, 53% of total forest product shipments were logs, 21% pulpwood and 26% finished products such as lumber, plywood, pulp and newsprint. Beaver Cove, Crofton and Port Alberni recorded the largest volumes of log shipments in 1980 (over 750,000 tonnes each). Significant pulpwood shipments were recorded at Crofton, Nanaimo and Campbell River (over 750,000 tonnes each) and the largest volumes of finished products were handled through Nanaimo and Port Alberni (over 750,000 tonnes).

Other commodities being shipped in large volumes during 1980 included sand, gravel, stone, petroleum products and copper concentrates. Victoria shipped over 1.7 million tonnes of mining and construction materials while Campbell River, Nanaimo, and Port Alice each shipped over 250,000 tonnes. Victoria and Nanaimo also recorded shipments of over 500,000 tonnes in petroleum products during 1980. Manufactured goods and consumer related products represented much smaller volumes.

Marine projections prepared during this study suggest that total marine shipments will grow quite slowly compared to other transport modes, at an average rate of 0.7% per annum. This is primarily due to the predominance of forest products in the total marine shipments from Vancouver Island, and the no-growth assumption beyond 1986 used for the forest industry. Annual tonnages in the year 2001 are projected to be nearly 30 million tonnes, up from the 25.6 million tonnes shipped during 1980.

Victoria, Campbell River, Nanaimo and Crofton would continue to have the largest volumes. As the projected growth is very modest, it is not likely that any serious capacity problem would have to be addressed.

3.0 MAJOR RECOMMENDATIONS FOR CO-ORDINATING DATA COLLECTION EFFORTS

As indicated at the beginning of this chapter, serious deficiencies were identified throughout this "Traffic Analysis and Forecasts" project in the data currently available to describe the transportation system serving Vancouver Island and to help explain the many traffic flows. As part of this project, recommendations were developed to address some of these deficiencies.

Recommendations for large-scale, new data collection exercises were ranked as secondary to identifying specific areas in which the co-ordination of existing efforts would yield new and better information. Thus, the three recommendations presented in this section focus on system-wide planning and on the co-ordination of data collection and transportation studies undertaken by various agencies.

3.1 Road-Side Interview Standards

A major difficulty in the current project was the need to integrate information from a variety of traffic surveys, none of which had been designed with any regard for possible utilization beyond its immediate objectives or in conjunction with other surveys. Therefore, a system of "standards" for roadside interviewing should be developed by the Ministry of Transportation and Highways, in collaboration with the major organizations involved in Vancouver Island road transportation.

Such "standards" should include a common set of definitions, a comprehensive system of geographical zones covering Vancouver Island and off-Island points, and a basic set of questions to be included in each roadside interview. The standards might also identify preferred locations at which on-going surveys might be conducted so that survey results can be combined more readily into an overall picture of traffic on Vancouver Island. They should also suggest a minimum time duration for surveys, preferred times of the year, and uniform roadside procedures.

3.2 Co-ordinated Passenger Interviews

Another difficulty in the current study was the tremendous lack of available information on passenger markets for the various transport modes. The information which was available dealt almost exclusively with traffic volumes on a route-by-route basis, providing no indication of the passengers' ultimate origins or destinations. Therefore, it is recommended that the Ministry of Transportation and Highways encourage the co-ordination of passenger interviewing which is conducted from time to time by the various carriers.

Co-ordination attempts should include the development of a common set of definitions, geographic zones, and route codes which might be used in all surveys. A basic set of questions to be asked of passengers might also be developed. These might include questions concerning purpose of trip, reason for selection of a particular transport mode, ultimate origin and destination, and the identification of mode transfers.

The encouragement of "co-ordinated" passenger surveys conducted by individual carriers, agencies or planning groups would permit the integration of results on an Island-wide basis. Survey data would be more useful, providing comprehensive information about passenger travel patterns.

3.3 Comprehensive Commercial Truck Information

During the current study, it was possible to compile only a partial origin-destination matrix of commercial vehicle trips on Vancouver Island. No information was available about tonnages of freight shipped by truck or type of cargo handled. It was not possible to produce a complete description of commercial vehicle traffic on the Island.

Therefore, steps need to be taken to improve data collection efforts for commercial vehicle freight. In collaboration with the major trucking firms and businesses shipping via truck, the Ministry of Transportation and Highways should seek ways of routinely developing data on the frequency of shipments, origin-destination information, and details on the type of cargo being handled. Identification of the extent of modal transfers should also be sought.

The implementation of common systems of definitions, freight codes and geographic zones should be encouraged throughout the industry. Through simple modifications of, or additions to shipping manifests, appropriate data could be captured as part of routine, day-to-day operations. Then, through periodic analyses of these documents, system-wide information could be quickly complliled. However, only through system-wide co-ordination and co-operation can such comprehensive truck information be developed.

4.0 ADDITIONAL RECOMMENDATIONS FOR INDIVIDUAL TRANSPORT MODES

The work done in compiling and analyzing this inventory of Vancouver Island's present transportation system also revealed specific gaps in the existing information base. These gaps represent areas in which data are either missing or incomplete and where additional information would be useful in order to better understand current levels of transportation activity.

A number of areas have been identified, for example, where further analyses might help to refine the existing data or improve their accuracy. Additional analytical effort in a few key areas could produce a wider range of information, making the existing data base more useful for addressing specific policy issues or considering policy options.

Accordingly, additional recommendations for continued data collection, additional data development, and for further analytical work related to the Vancouver Island transportation system are put forward in Appendix I.

APPENDICES

APPENDIX A

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APPENDIX B-1

POPULATION AND ACCOMMODATION OF VANCOUVER ISLAND BY ZONE

Zone		Estimated Population 1976	Estimated Population 1981	Projected Population 2001	Annual Growth Rate (%)	Tourist Accommodation 1981
No.	Name					
1	Victoria/Esquimalt/Oak Bay	98,325	102,927	117,400	7	4,449
2	Saanich	75,033	80,052	99,900	1.1	491
3	C & N Saanich/Sidney/Saltspring Is./Outer Gulf Is.	25,677	31,180	58,100	3.2	637
4	Colwood/Langford/Metchosin/View Royal	25,732	28,958	50,100	2.8	386
5	Sooke	5,335	6,004	10,400	2.8	207
6	Port Renfrew	314	353	600	2.7	1
7	Shawnigan	10,192	11,499	18,600	2.4	265
8	Duncan/N Cowichan/Chemainus	24,953	26,152	45,600	2.4	544
9	Ladysmith	7,699	9,113	15,100	2.6	281
10	Lake Cowichan/Youbou	5,815	5,655	6,700	0.9	59
11	Cassidy/Gabriola	5,500	6,509	10,800	2.6	70
12	Nanaimo	41,246	48,818	81,000	2.6	488
13	Parksville	8,291	12,424	28,700	4.3	1,474
14	Nanaimo (Rural)	550	651	1,100	2.7	1
15	Qualicum Beach	4,869	7,296	16,900	4.3	1,049
16	Port Alberni	24,135	24,416	30,200	1.1	467
17	Nitinat	2,574	2,604	3,200	1.0	1
18	Bamfield	322	326	400	1.0	21
19	Effingham	2,896	2,930	3,600	1.0	48
20	Tofino/Ucluelet	2,253	2,279	2,800	1.0	879
21	Courtenay/Comox	19,130	22,893	42,000	3.1	692
22	Cumberland	10,300	12,327	22,600	3.1	662
23	Campbell River	17,595	21,368	42,800	3.5	1,226
24	Strathcona (Rural)	2,111	2,564	5,100	3.5	210
25	Sayward	1,408	1,709	3,400	3.5	171
26	Gold River	1,770	1,966	3,100	2.3	91
27	Tahsis/Zeballos	2,655	2,949	4,700	2.4	45
28	Port McNeill	3,492	4,108	7,300	2.4	119
29	Port Hardy/Port Alice	7,856	9,242	16,300	2.6	432
Total		438,028	491,272	748,500	2.1	15,466

Source: The 1976 and 1981 population figures were derived from Canada Census data.
The 2001 population projections were derived from the B.C. Research publication, "British Columbia Population Projections 1984-2006".
Accommodation figures represent the number of accommodaton units available in the area and were derived from the British Columbia Accommodation and Travel Information Guide 1981.

APPENDIX C-1

DESCRIPTION OF MAJOR HIGHWAYS ON VANCOUVER ISLAND

Highway 1 (Trans-Canada Highway);

Extends from Victoria to Nanaimo, via Goldstream, Bamberton, Mill Bay, Cowichan Station, Duncan, Chemainus, Ladysmith, Cassidy and South Wellington.

Highway 1 continues eastwards to the Lower Mainland, via B.C. Ferries between Departure Bay (Nanaimo) and Horseshoe Bay (West Vancouver).

Within Victoria, Highway 1 consists of three traffic lanes in each direction, becoming a 2 x 2 lane highway from the Highway 17 intersection to the Thetis Lake intersection (Hwys. 1/1A/14 intersection). Speed limits in effect are 50 km/h (urban areas) and 80 km/h. From this location to Duncan, Highway 1 alternates from a 2-lane road (1 lane in each direction) to a 3-lane road (alternating 2-lane northbound with 1-lane southbound, and vice versa), with short sections of 2 x 2 lane operations. Speed limited are generally 80 km/h with sections at 60 km/h, with passing restrictions.

From Duncan to Chemainus, Highway 1 has 2 x 2 lanes, with speed limits between 50 (urban) and 90 km/h. Between Chemainus and Nanaimo, the highway alternates between sections of 2 x 2 lane road, a short 2 x 3 lane section, and 2-lane sections through restricted areas (e.g. narrow bridges). Speed limits in this section vary from 50 km/h (in urban areas) to 70, 80 and 90 km/h, depending on land use and geometrics.

Total length of Highway 1 on Vancouver Island is about 115 kilometers.

Highway 1A;

Extending from Victoria to Goldstream (Highway 1 intersection), Highway 1A is a 2-lane road between Highway 1 and Highway 14, and a 4-lane (2 x 2) road in the Colwood area. The posted speed limit is 50 km/h throughout the 33 kilometers of highway.

Highway 4;

Extends from Parksville to Tofino and Ucluelet, via Coombs and Port Alberni.

Between Parksville and Port Alberni, Highway 4 is generally a 2-lane road, with short sections of alternating 3-lane operation to facilitate passing. From Port Alberni to the Tofino/Ucluelet intersection, Highway 4 is a 2-lane road with passing restrictions, while the section between Tofino and Ucluelet is similarly 2 lanes with restrictions on passing operations.

Speed limits on the highway vary from 50 and 60 km/h in urban areas to 80 km/h in rural areas. Total length of Highway #4 is approximately 186 kilometers.

Highway 4A;

Extends from Highway 4 (near Coombs), to Qualicum Beach and consists of about 8 kilometers of 2-lane road with speed limits of 50 km/h (urban) and 80 km/h.

Highway 14;

Extends from Highway 1A (Colwood) to Port Renfrew, via Sooke and Jordan River.

In the Colwood area, the road consists of 2 x 2 lanes and becomes a two-lane highway for the remainder of its total length of 95 kilometers to Port Renfrew.

Speed limits are 50 and 60 km/h within urban/suburban areas, and 80 km/h on rural sections.

Highway 17;

Extends from Victoria to Swartz Bay Ferry Terminal, via Royal Oak, Central Saanich and Sidney.

Within Victoria, Highway 17 alternates between 3 traffic lanes in each direction, and 2 x 2 lanes with parking provision. North of Victoria, Highway 17 becomes a divided highway with two lanes in each direction for its entire length.

Speed limits on the road vary from 50 and 60 km/h in the urban/suburban areas and in close proximity to the Swartz Bay Terminal, to 80 km/h on rural, divided sections.

Highway 17 continues to the Lower Mainland, via B.C. Ferries between Swartz Bay and Tsawwassen.

Total length of Highway 17 on Vancouver Island is about 33 kilometers.

Highway 17A;

Extends from Royal Oak (Highway 17) to Patricia Bay (Highway 17), via Brentwood Bay (Central Saanich). It consists of a 2-lane road throughout its total length of about 28 kilometers.

Speed limits on Highway 17A are generally 50 and 60 km/h, with a short section of 70 km/h.

Highway 18;

Extends from Duncan to Lake Cowichan, with arms to Youbou and Honeymoon Bay.

From Duncan to Lake Cowichan, Highway 18 generally consists of two lanes, with short sections of 3-lane roadway to facilitate passing. From Lake Cowichan to Youbou, Highway 18 is mainly a 2-lane operation with passing restrictions. Between Lake Cowichan and Honeymoon Bay, Highway 18 consists of a 2-lane road with passing permitted.

Speed limits on Highway 18 vary from 50 and 60 km/h in urban areas, to 80 and 90 km/h in rural areas.

In total, Highway 18 covers about 57 kilometers.

From Youbou and Honeymoon Bay, the road extends westwards (by means of an all-weather, gravel facility) to Nitinat and, eventually, to Bamfield on the west coast.

Highway 19;

Extends from Nanaimo to Port Hardy, via Parksville, Qualicum Beach, Courtenay, Campbell River, Woss, and Port McNeill.

From Nanaimo to the Port Alberni turn-off (Highway 4), Highway 19 consists of a combination of 4-lane (2 x 2) and 2-lane operations. Between the Highway 4 intersection (Parksville) and Port Hardy, Highway 19 is generally of a 2-lane standard with short 3 and 4-lane sections to provide passing opportunities.

Speed limits along Highway 19 vary from 50 and 60 km/h in urban/suburban areas to 70, 80 and 90 km/h on rural sections.

Total length of Highway 19 from Nanaimo to Port Hardy is almost 390 kilometers.

Highway 28;

Extends from Campbell River to Gold River and consists of 2 lanes of roadway along its 88 kilometer length, with a short 3-lane passing section. Speed limits on Highway #28 are generally 80 km/h.

APPENDIX C-2

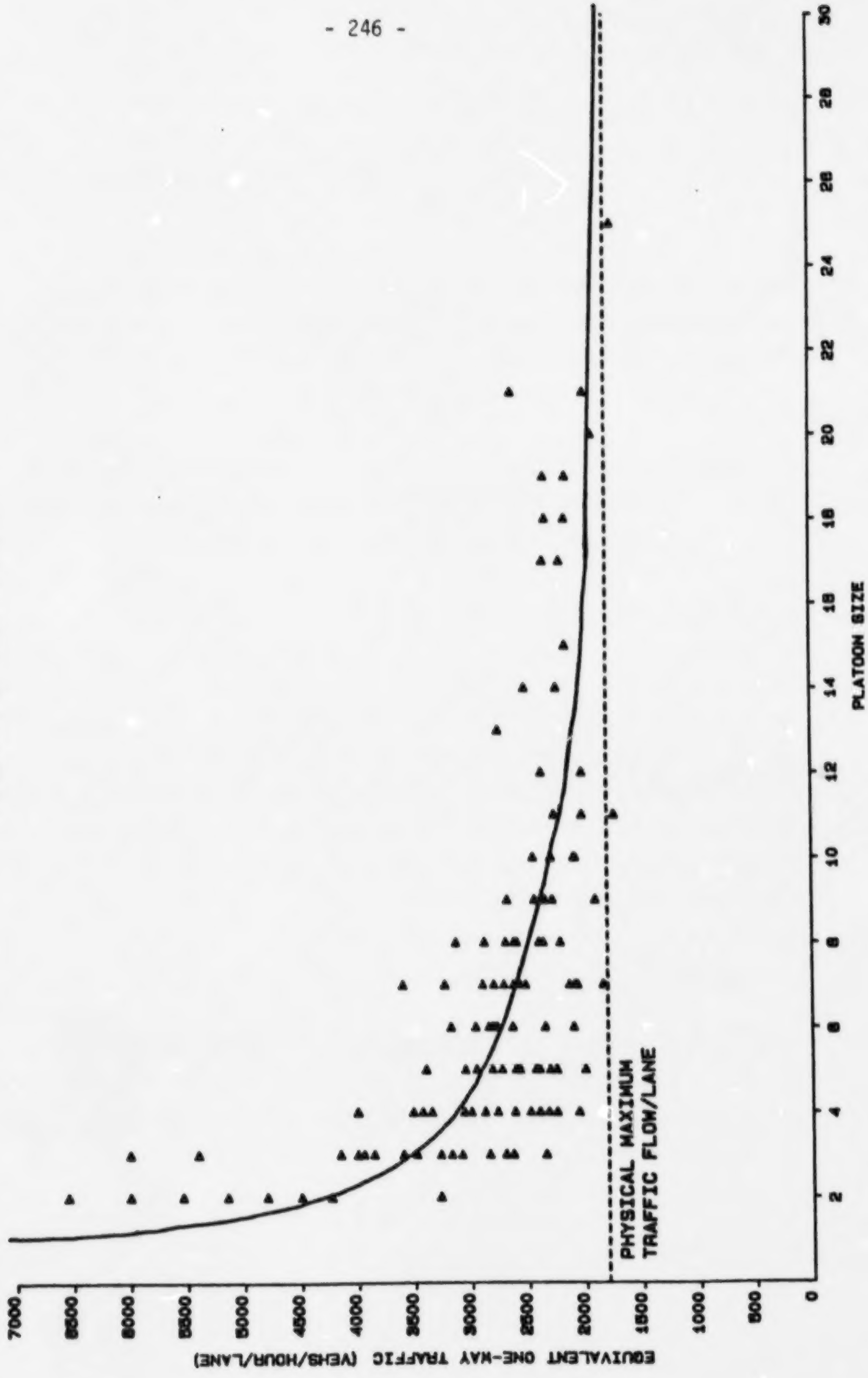
TRAFFIC SURVEY TO ESTIMATE HIGHWAY CAPACITY

As part of the study, a brief traffic survey was undertaken in November 1982 during a post-peak traffic period on a section of Highway 1 near Millstream (west of Victoria). Highway 1 in this location is a 2-lane road with wide gravel shoulders and good sight-distances. Intersections are some distance from the survey point, passing is generally restricted, and a speed limit of 80 km/h is in effect. Weather conditions throughout the survey were dry and fair, although darkness fell during the latter part of the survey.

Travel times (t) for various lengths and compositions of traffic 'platoons' (a series of vehicles travelling in line at approximately the same speed) of varying length and composition were recorded as they passed a particular point on the highway. The number of vehicles (n) in the platoon was also recorded, and the 'equivalent hourly flow' (in vehicles per hour per traffic lane) was calculated for the platoon.

The equivalent hourly flow in one direction was then plotted against platoon size . The results are illustrated in Figure I. The assumption in this analysis is that the maximum traffic flow is reached for a platoon size of "infinity". Thus, the asymptote to the curve represents the physical limit of traffic flow in each lane, in this case 1800 vehicles per hour. This assumes that a steady stream of vehicles is able to travel virtually bumper-to-bumper for extended periods, a situation which would be unacceptable to drivers and likely to become unstable very quickly. Thus, an hourly figure of 1,300-1,500 vehicles per lane would appear to be a more reasonable capacity limit.

FIGURE I
ROAD CAPACITY ANALYSIS
HIGHWAY NO. 1 NEAR MILLSTREAM INTERCHANGE
NOVEMBER 2, 1982 PM PEAK



B.C. RESEARCH

APPENDIX C-3

PROCEDURES FOR PROJECTING AUTOMOBILE TRAFFIC ON VANCOUVER ISLAND

Automobile traffic on Vancouver Island was analyzed under two headings: traffic by Island residents and traffic by off-Island Residents. Although they were treated separately, each involved the same analysis and projection procedures.

These procedures are shown schematically in Figure II and are explained in the paragraphs which follow - their letter designations correspond to the boxes in the schematic diagram.

a) Define Zones

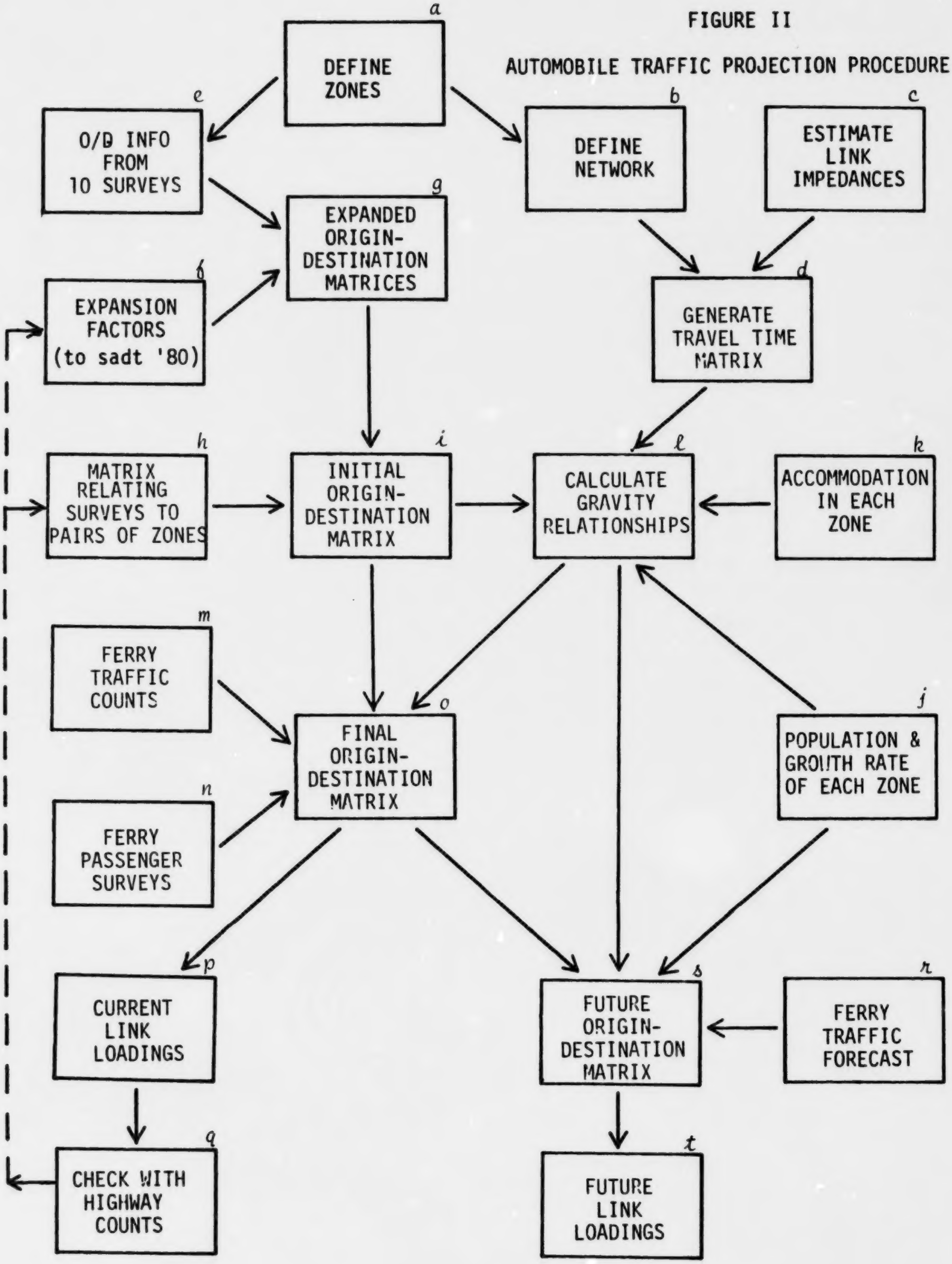
Vancouver Island was divided into 29 zones based upon the zone system used by the Ministry of Transportation and Highways. In addition, seven off-Island zones were defined to correspond to the seven ferry routes which connect Vancouver Island to the mainland (four to the British Columbia Mainland and three to the USA). These zones were listed in Table B-1 and are illustrated in each of the 23 Maps used throughout the report.

b) Define Network

The various roads and highways on Vancouver Island (see Map 1 in Chapter C) were represented by a simplified road network consisting of 34 nodes and 47 highway links (see Map 2 in Chapter C). The nodes are summarized below.

FIGURE II

AUTOMOBILE TRAFFIC PROJECTION PROCEDURE


a
DEFINE ZONES
e
O/D INFO FROM 10 SURVEYS
b
DEFINE NETWORK
c
ESTIMATE LINK IMPEDANCES
g
EXPANDED ORIGIN-DESTINATION MATRICES
f
EXPANSION FACTORS (to sadt '80)
d
GENERATE TRAVEL TIME MATRIX
h
MATRIX RELATING SURVEYS TO PAIRS OF ZONES
i
INITIAL ORIGIN-DESTINATION MATRIX
l
CALCULATE GRAVITY RELATIONSHIPS
k
ACCOMMODATION IN EACH ZONE
m
FERRY TRAFFIC COUNTS
o
FINAL ORIGIN-DESTINATION MATRIX
j
POPULATION & GROWTH RATE OF EACH ZONE
n
FERRY PASSENGER SURVEYS
p
CURRENT LINK LOADINGS
s
FUTURE ORIGIN-DESTINATION MATRIX
r
FERRY TRAFFIC FORECAST
q
CHECK WITH HIGHWAY COUNTS
t
FUTURE LINK LOADINGS

SUMMARY OF HIGHWAY NODES

Node #	Zone #	Description
50	1	Victoria
51	1	Junction of Hwy 17 & Hwy 1
52	2	Hwy 17 (Sannich)
53	3	Sidney
54	3	Swartz Bay
55	2	Junction of Hwy 1 & Hwy 14
56	4	Goldstream Park
57	7	Malahat
58	8	Junction of Hwy 1 & Hwy 18
59	9	Ladysmith
60	11	Cassidy
61	12	Nanaimo
62	13	Parksville
63	15	Qualicum Beach
64	21	Courtenay
65	23	Campbell River
66	25	Hwy 19 (Sayward)
67	28	Woss
68	28	Port McNeill
69	29	Port Hardy
70	4	Colwood
71	5	Sooke
72	6	Port Renfrew
73	10	Lake Cowichan
74	18	Bamfield
75	14	Nanaimo (rural)
76	16	Port Alberni
77	17	Nitinat
78	19	Hwy 4 (Effingham)
79	20	Hwy 4 fork to Tofino/Ucluelet
80	24	Hwy 28 (Strathcona-rural)
81	26	Gold River
82	27	Tahsis
83	15	Hwy 19 (near Bowser)

c) Link Impedances

For each link in the network, the travel time and distance between nodes for that link were recorded from the visual road inventory maintained by the Ministry of Transportation and Highways (using the highway scanner equipment developed by B.C. Research) and from other data provided by the Ministry.

d) Travel Time Matrix

Using the travel times obtained for each network link, the time taken to travel between any two zones was calculated using a minimum path algorithm. Thus, traffic between two zones was assumed to always follow the shortest route (by time) available. The result was a symmetrical 36 X 36 matrix of travel times. Each diagonal element (designating intrazonal travel) was set to an arbitrarily small value, as this would have no impact on inter-zonal traffic assignments.

e) Origin-Destination Information

In recent years, as part of various transportation studies, roadside/interview surveys were carried out at a number of highway locations on Vancouver Island:

Bloedel (Highway 19, August 1981)
Gold River (Highway 28, August 1981)
Merville (Highway 19, July 1980)
Nanaimo (Highway 1, July 1980)
Bowser (Highway 19, July 1977)
Cameron Lake (Highway 4, July 1977)
Nanoose (Highway 19, July 1977)
Chemainus (Highway 1, July 1977)
Malahat (Highway 1, July 1977)
Capital Regional District (Various locations, July-August, 1977)

Each of these covered only a portion of the total Vancouver Island highway traffic, but together they provide reasonable coverage of all 29 zones on the Island.

The Ministry of Transportation and Highways produced tabulations of trips by origin and destination for each of the surveys, using the system of zones defined in this project.

Separate tabulations were produced for trips made by Island Residents and by off-Island Residents.

f) Expansion Factors (to SADT '80)

Since the ten roadside interview surveys generally extended over different lengths of time, they sampled varying proportions of the total traffic at each location. Furthermore, they took place in different years. Therefore, to adjust them all to an equivalent base, an expansion factor was calculated for each survey whereby the counts taken in that survey could be scaled up or down to give the Summer Average Daily Traffic count observed at that location in 1980.

g) Expanded Origin-Destination Matrices

Using the expansion factors, a 1980 Summer Average Daily Traffic representation was produced for each of the 10 surveys.

h) Matrix Relating Surveys to Pairs of Zones

Because the 10 roadside interview surveys overlapped to some extent, they could not be added together directly. Instead, for each origin-destination pair of zones (i.e. cell) in the 29 X 29 Island Origin-Destination matrix a judgement was made as to which of the 10 surveys was likely to have covered most of the traffic between the pair of zones concerned.

i) Initial Origin-Destination Matrix

From the results obtained in steps g) and h) above, an initial origin-destination matrix was constructed. Since it is reasonable to assume that on a daily basis the traffic flow between any two zones is equal in both directions, the initial origin-destination matrix was made symmetrical by averaging corresponding cells across the diagonal. This was considered to be a "raw" matrix in that it contained some missing elements. To estimate trips in these empty cells, relationships are derived in step l) below relating the number of trips between two zones to their population and the "impedance" (i.e. travel time) between them.

j) Population and Growth Rates of Each Zone

Using the known population (1981 Census) of the 13 school districts on Vancouver Island and the population of the major municipalities in them, the 1981 population of each of the 29 traffic zones was estimated. The projected population growth for each zone was estimated using the school district projections contained in B.C. Research's publication "British Columbia Population Projections 1984-2006".

k) Accommodation in Each Zone

From Tourism B.C.'s Accommodation Directory, the number of accommodation units (including hotel/motel rooms and tent/trailer sites) were obtained for each zone.

l) Calculate Gravity Relationships

Using the initial origin-destination matrix, "gravity" relationships were derived using regression analysis to relate the number of trips between two zones to the populations of the zones and the "impedance" (travel time rather than distance) between them. Cells in the matrix containing zero trips were excluded from this analysis. These gravity relationships assume that traffic between two zones increases in proportion to the populations of the origin and destination zones and decreases in proportion to the travel time between the two zones.

For Island-Resident traffic, the relationship is of the form:

$$N_I = k_I \frac{P_O^{\alpha} P_D^{\beta} P_S^{\gamma}}{d_{OD}^{\delta}}$$

where: N_I is the summer average daily traffic by Island Residents;
P_O is the population at the origin zone;
P_D is the population at the destination zone;

$$P_S = 1 + \frac{P_O - P_D}{(P_O + P_D)} \qquad \text{a size difference factor; } 1 \leq P_S \leq 2$$

d_{OD} is the impedance (travel time) between origin and destination;
k_I, α, β, γ, δ are parameters obtained from the regression analysis.

For off-Island Resident traffic, the relationship is similar but includes the number of accommodation units available in each zone:

$$N_T = k_T \frac{P_O^{\alpha} P_D^{\beta} A_O^{\gamma} A_D^{\delta}}{d_{OD}^{\varepsilon}}$$

where: A_O is the number of accommodation units in the origin zone;
A_D is the number of accommodation units in the destination zone;
k_T, α, β, γ, δ, ε are parameters obtained from the regression analysis and the remaining parameters are as defined above.

The equations that were obtained are as follows:

$$N_I = .53 \frac{P_O^{.6} \; P_D^{.6} \; P_S^{1.6}}{d_{OD}^{1.5}} \qquad R^2 = .62$$

and

$$N_T = .25 \frac{P_O^{.3} \; P_D^{.3} \; A_O^{.2} \; A_D^{.2}}{d_{OD}^{1.0}} \qquad R^2 = .49$$

m) Ferry Traffic Counts

Ferry traffic counts were obtained for ferries operating on the seven ferry routes connecting Vancouver Island to the British Columbia Mainland and the USA.

n) Ferry Passenger Surveys

Using past highway passenger surveys (UBC: summer 1977; B.C. Research: Winter 1978) the ferry traffic counts were split into Island-Resident and off-Island Resident traffic. Although in these surveys Vancouver Island was divided into only nine regions, the origin-destination tables produced by the surveys were helpful in allocating ferry traffic to the 29 zones defined in this project. The allocation of ferry traffic from each of the 9 regions to its corresponding zones was done in proportion to the 1976 population distribution among zones in each region.

o) Final Origin-Destination Matrix

Each cell in the 29 X 29 Island origin-destination matrix was checked to determine whether its count was consistent with the value predicted by the equations obtained in step 1) above. The only significant anomaly was the Victoria-Saanich traffic. This was not surprising since it involves traffic in a sizeable metropolitan area rather than the smaller town and rural pattern existing on the rest of the Island. The Victoria-Saanich cell was not adjusted and was not included in the calculation of gravity relationships. The gravity relationships were used to estimate the traffic count for all zero cells and for the few cells where the recorded count was more than 2 standard deviations away from the count predicted by the gravity relationship. The overall effect of this was minimal, as the predicted values for the zero cells were nearly always less than 10 and often 0. This was another confirmation that the overall origin-destination matrix was comprehensive.

Ferry traffic components were then added to the matrix, resulting in a final 36 X 36 matrix.

p) Current Link Loadings

The final origin-destination trip matrix was then loaded by computer onto the highway network using a minimum path algorithm. In this process, the trips in each cell of the 36 X 36 matrix were assigned to appropriate links connecting its origin and destination zones. If two or more alternate routes were possible, all traffic was assigned to the route having the shortest travel time. This assignment process, when completed for all cells in the matrix, produced the estimate of Summer 1980 traffic loadings on each link in the highway network.

q) Check with Highway Counts

The estimated traffic loadings on each link were checked as much as possible against actual observed traffic counts made by the Ministry of Transportation and Highways. On the whole, the predicted counts were only 1.6% lower than the observed counts and only a few links had sizable discrepancies. It was concluded that the predicted counts were generally in good agreement with the counts recorded in the field and were sufficiently accurate for the purposes of this study.

r) Ferry Traffic Forecast

Forecasts of ferry traffic were made by extrapolating their long-term growth rates.

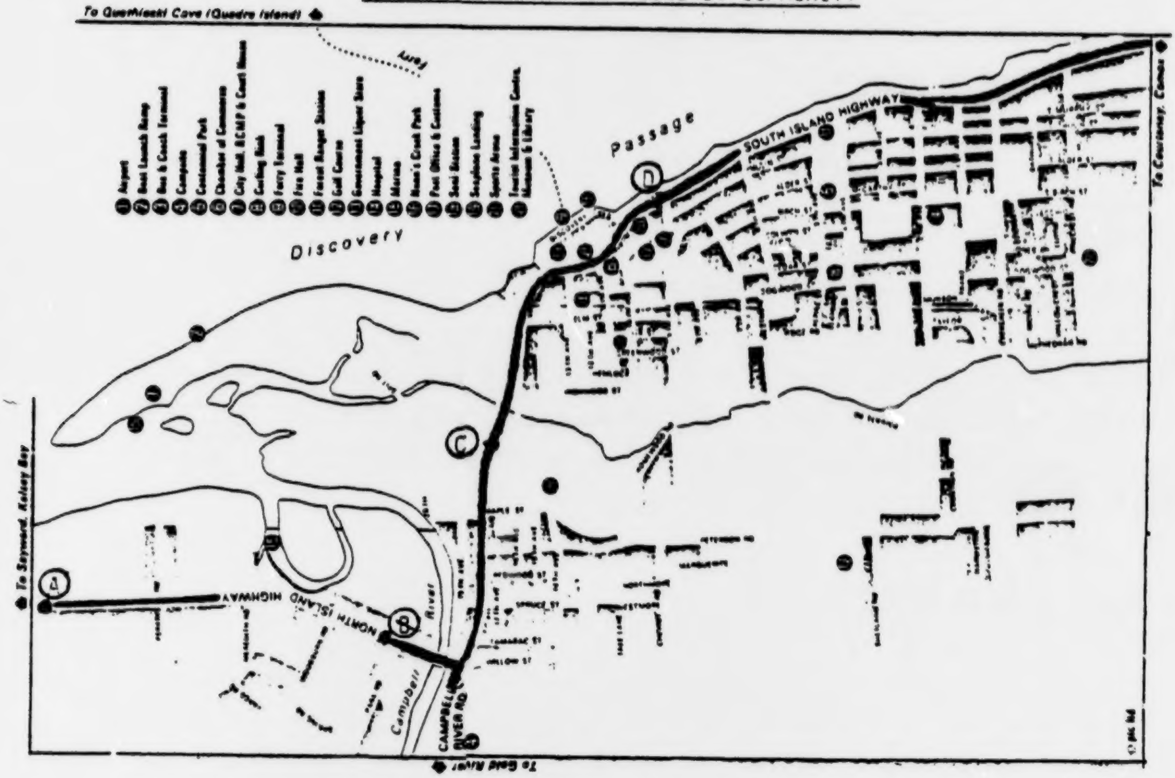
s) Future Origin-Destination Matrix

The projected growth rates of the population of each zone and ferry traffic were then applied to the corresponding row and column of the final origin-destination matrix. Using the "Frater" method, a future origin-destination matrix was then generated.

t) Future Link Loadings

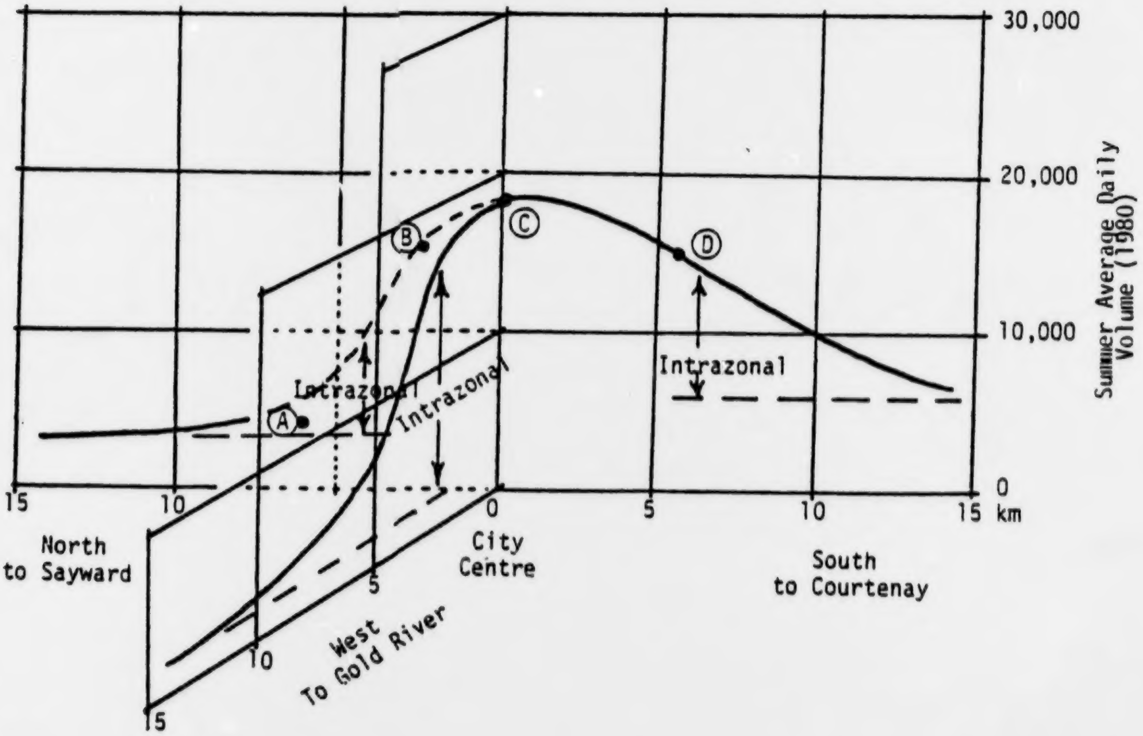
From the future origin-destination matrix, the traffic loading projected on each link was calculated using the same computer process referred to in step p) above. In addition, a modified network was developed which includes five possible future highway links. Using the future origin-destination matrix, the traffic loading projected on each link in the possible future network was also calculated.

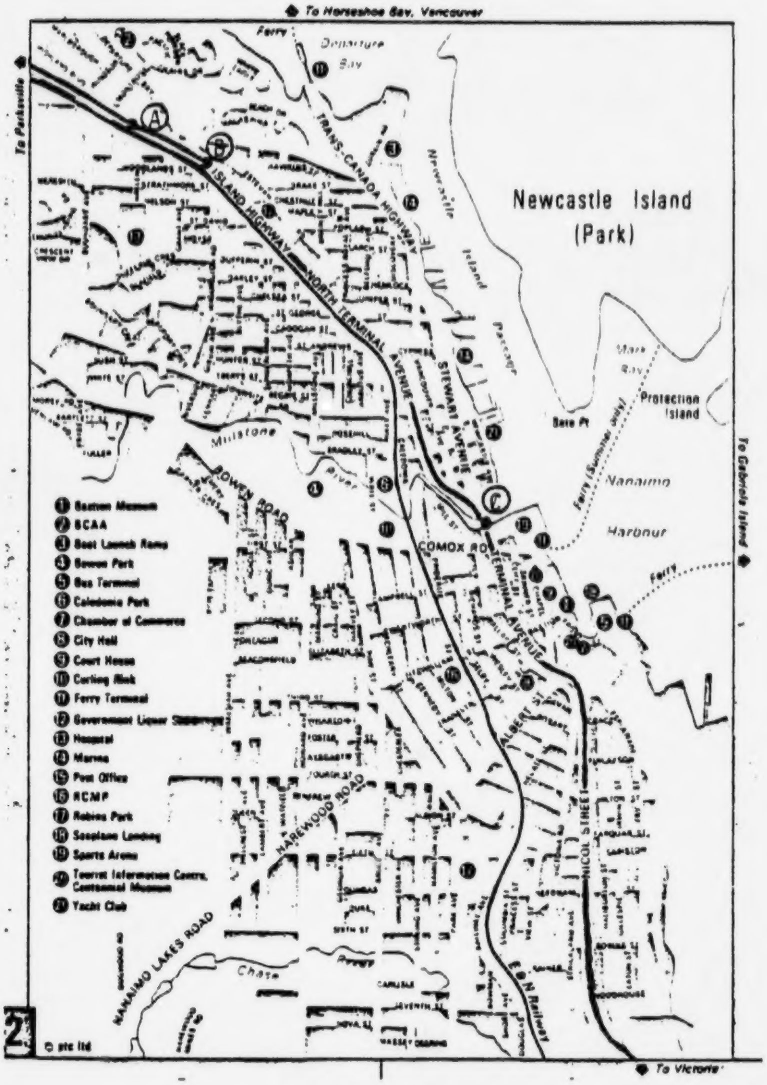
APPENDIX C-4
INTRA-ZONAL TRAFFIC FLOWS BY COMMUNITY



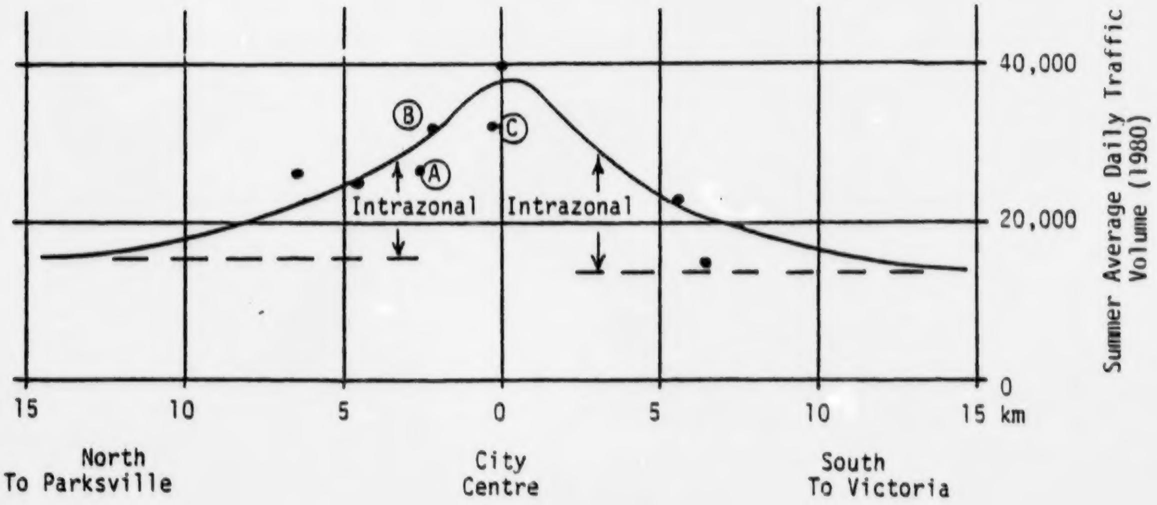
To Quathiaski Cove (Quadra Island)
Ferry
1 Airport
2 Boat Launch Ramp
3 Bus & Coach Terminal
4 Campsite
5 Centennial Park
6 Chamber of Commerce
7 City Hall, RCMP & Court House
8 Curling Rink
9 Ferry Terminal
10 Fire Hall
11 Forest Ranger Station
12 Golf Course
13 Government Liquor Store
14 Hospital
15 Marina
16 Nunn's Creek Park
17 Post Office & Customs
18 Seal Station
19 Seaplane Landing
20 Sports Arena
21 Tourist Information Centre, Museum & Library
Discovery
Passage
SOUTH ISLAND HIGHWAY
To Courtenay, Comox
To Sayward, Kelsey Bay
NORTH ISLAND HIGHWAY
Campbell River
CAMPBELL RIVER RD
To Gold River
A
B
C
D

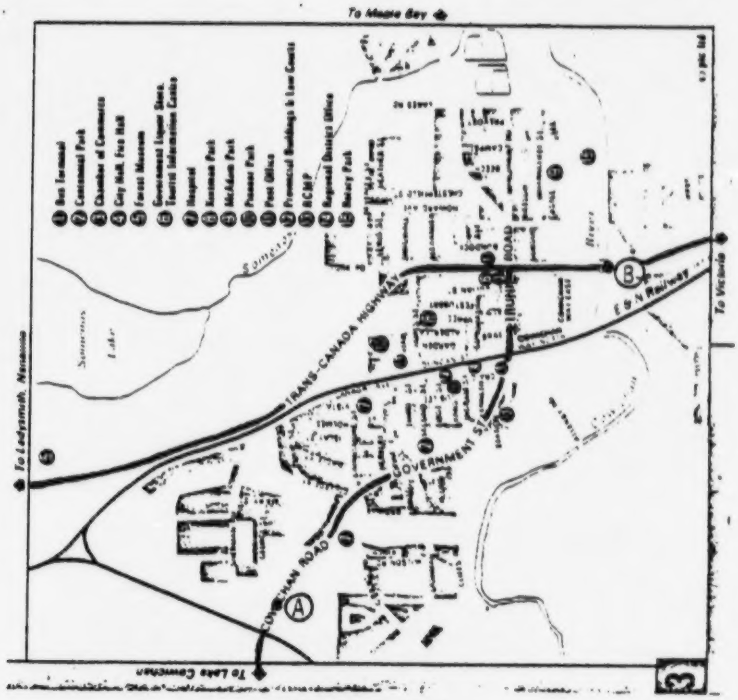
CAMPBELL RIVER



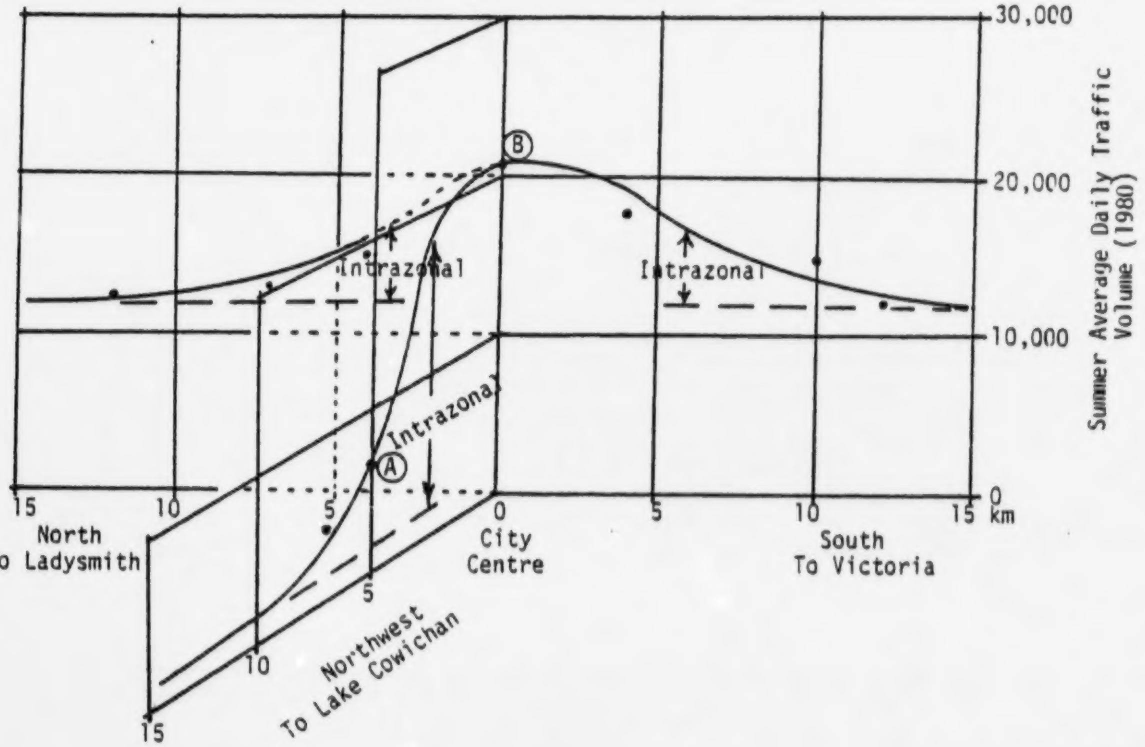

To Horseshoe Bay, Vancouver
To Parksville
Departure Bay
Ferry
Newcastle Island (Park)
Newcastle Island Passage
Mark Bay
Protection Island
Nanaimo Harbour
Ferry
To Gabriola Island
To Victoria
TRANS-CANADA HIGHWAY
ISLAND HIGHWAY
NORTH TERMINAL AVENUE
STEWART AVENUE
TERMINAL AVENUE
COMOX RD
BOWEN ROAD
HAREWOOD ROAD
NANAIMO LAKES ROAD
ALBERT ST
NICOL STREET
E & N Railway
Millstone River
Chase River
A
B
C
1 Bastion Museum
2 BCAA
3 Boat Launch Ramp
4 Bowen Park
5 Bus Terminal
6 Caledonia Park
7 Chamber of Commerce
8 City Hall
9 Court House
10 Curling Rink
11 Ferry Terminal
12 Government Liquor Store
13 Hospital
14 Marina
15 Post Office
16 RCMP
17 Robins Park
18 Seaplane Landing
19 Sports Arena
20 Tourist Information Centre, Centennial Museum
21 Yacht Club
2
© stc ltd

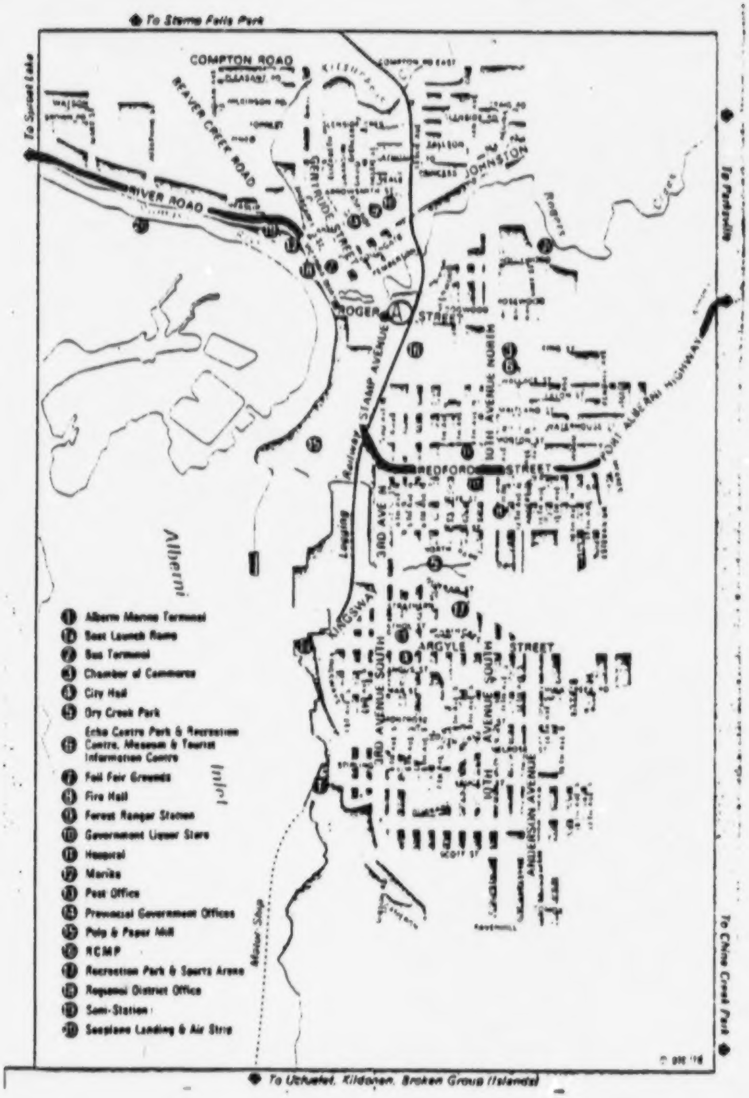
NANAIMO


Summer Average Daily Traffic Volume (1980)
40,000
20,000
0
B
A
C
Intrazonal
Intrazonal
15
10
5
0
5
10
15 km
North
To Parksville
City
Centre
South
To Victoria

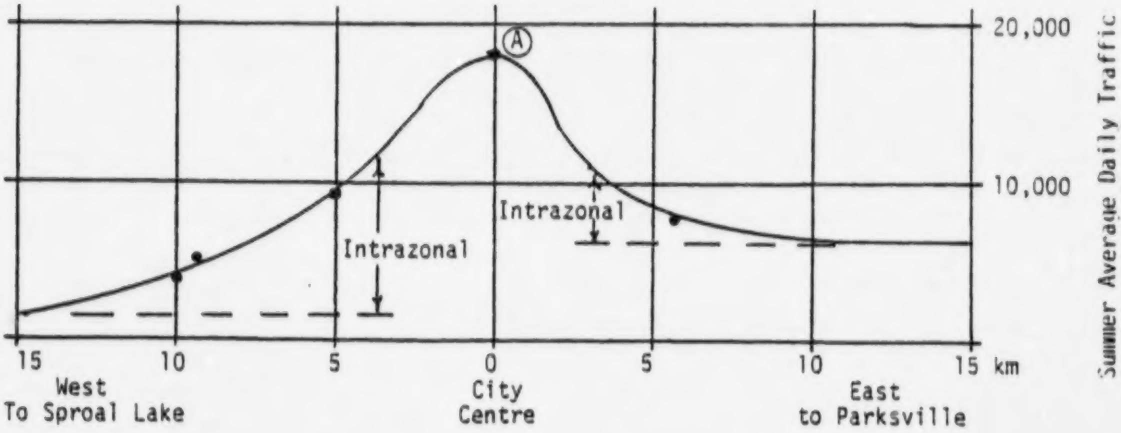

To Maple Bay
To Ladysmith, Nanaimo
To Victoria
To Lake Cowichan
1 Bus Terminal
2 Centennial Park
3 Chamber of Commerce
4 City Hall, Fire Hall
5 Forest Museum
6 Government Liquor Store, Tourist Information Centre
7 Hospital
9 McAdam Park
10 Pioneer Park
11 Post Office
12 Provincial Buildings & Law Courts
13 RCMP
14 Regional District Office
15 Rotary Park
TRANS-CANADA HIGHWAY
GOVERNMENT ST.
COWICHAN ROAD
TRUNK ROAD
E & N Railway
A
B
3

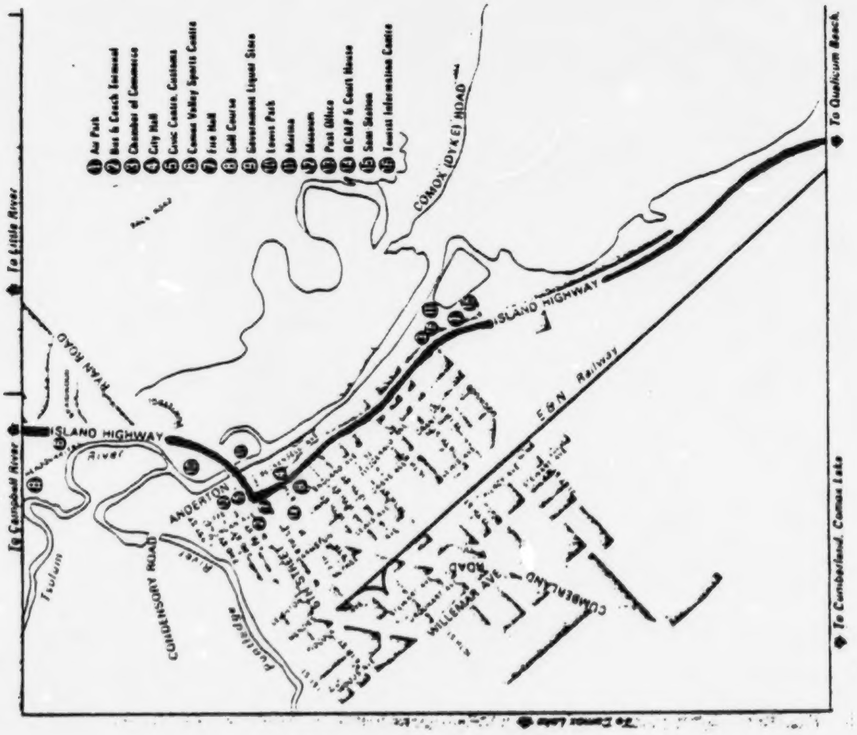
DUNCAN


30,000
20,000
10,000
0
Summer Average Daily Traffic Volume (1980)
B
A
Intrazonal
Intrazonal
Intrazonal
15
10
5
0
5
10
15 km
North
To Ladysmith
City
Centre
South
To Victoria
5
10
15
Northwest
To Lake Cowichan

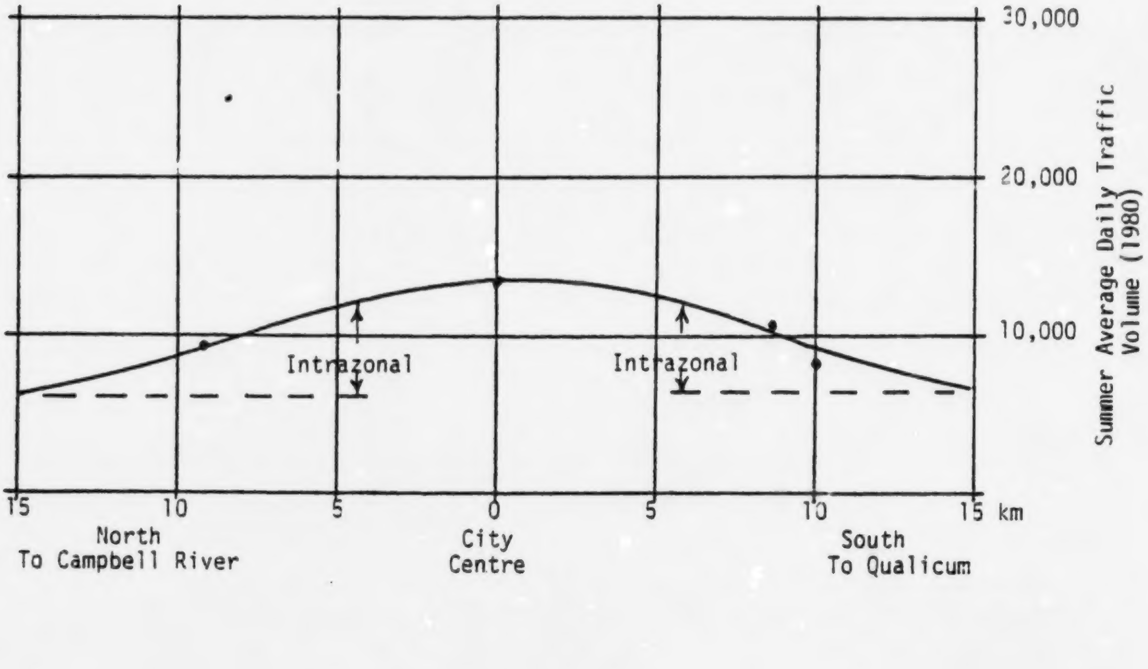

To Stamp Falls Park
To Sproat Lake
COMPTON ROAD
BEAVER CREEK ROAD
GERTRUDE STREET
JOHNSTON
RIVER ROAD
ROGER STREET
A
STAMP AVENUE
10TH AVENUE NORTH
PORT ALBERNI HIGHWAY
BEDFORD STREET
Railway
Logging
3RD AVE N
KINGSWAY
ARGYLE STREET
3RD AVENUE SOUTH
10TH AVENUE SOUTH
ANDERSON AVENUE
Alberni
Inlet
Motor Ship
To Parksville
To China Creek Park
Alberni Marine Terminal
Boat Launch Ramp
Bus Terminal
Chamber of Commerce
City Hall
Dry Creek Park
Echo Centre Park & Recreation Centre, Museum & Tourist Information Centre
Fall Fair Grounds
Fire Hall
Forest Ranger Station
Government Liquor Store
Hospital
Marina
Post Office
Provincial Government Offices
Pulp & Paper Mill
RCMP
Recreation Park & Sports Arena
Regional District Office
Sani-Station
Seaplane Landing & Air Strip
To Uchuelet, Kildonan, Broken Group (Islands)

PORT ALBERNI




① Air Park
② Bus & Coach Terminal
③ Chamber of Commerce
④ City Hall
⑤ Civic Centre, Customs
⑥ Comox Valley Sports Centre
⑦ Fire Hall
⑧ Golf Course
⑨ Government Liquor Store
⑩ Lewis Park
⑪ Marina
⑫ Museum
⑬ Post Office
⑭ RCMP & Court House
⑮ Sani-Station
⑯ Tourist Information Centre
To Little River
To Campbell River
To Qualicum Beach
To Cumberland, Comox Lake
COMOX (DYKE) ROAD
ISLAND HIGHWAY
ISLAND HIGHWAY
RYAN ROAD
River
Tsolum
ANDERTON
CONDENSORY ROAD
River
Puntledge
E & N Railway
CUMBERLAND ROAD
WILLEMAR AVE.

COURTENAY


30,000
20,000
10,000
Summer Average Daily Traffic Volume (1980)
Intrazonal
Intrazonal
15
10
5
0
5
10
15 km
North
To Campbell River
City
Centre
South
To Qualicum

APPENDIX D-1

DESCRIPTION OF B.C. FERRY CORPORATION'S VESSELS

(1982)

Vessel Name	Capacity Cars	Capacity Pass.	Service Speed (knots)	Overhead Clearance (m)
Bowen Queen	70	340	14	4.57
Dogwood Princess II	-	38	16	-
Howe Sound Queen	70	330	10	-
Mayne Queen	70	340	14	4.57
Mill Bay	16	168	9	-
Pender Queen	40	250	11	3.66
Powell River Queen	70	400	14	5.74
Queen of Albernial	45	450	23	4.72
Queen of Burnaby	192	1,360	18	4.47
Queen of Coquitlam	362	1,466	22	4.87
Queen of Cowichan	362	1,466	22	4.87
Queen of Esquimalt	350	1,360	18	4.47
Queen of the Islands	40	483	16	4.19
Queen of Nanaimo	192	1,360	18	4.47
Queen of New Westminster	192	791	18	4.47
Queen of the North	157	750	22	3.96
Queen of Prince Rupert	80	458	18	4.42
Queen of Sannich	350	1,360	18	4.47
Queen of Sidney	138	989	18	4.65
Queen of Tsawwassen	138	989	18	4.47
Queen of Vancouver	286	1,360	18	4.75
Queen of Victoria	286	1,360	18	4.75
Saltspring Queen	36	187	10	4.57
Sunshine Coast Queen	200	973	13	4.57
Vesuvius Queen	35	177	10	4.27

Source: B.C. Ferry Corporation.

APPENDIX D-2

DESCRIPTION OF MINISTRY OF TRANSPORATION AND HIGHWAYS' VESSELS (1982)

Vessel Name	Service Speed Knots	Capacity		Overhead Clearances
		Pass.	Cars	Metres
ALBERT J. SAVOIE (a) Garibaldi '64 (b) Westwood '72	10	150	16	4.57
GARIBALDI II	10.5	400	5 (or 2 Trucks)	4.57
KAHLOKE	11	150	30	Highway Limit
KLITSA (a) Denman Queen '73	10	150	26	Highway Limit
KULLEET	12	150	26	Highway Limit
KWUNA	12	150	25	Highway Limit
NICOLA				
(a) Quadra Queen '69	10	150	16	4.57
(b) Cortes Queen '80	11	150	16	4.57
NIMPKISH	11	145	16	4.57
NORTH ISLAND PRINCESS	10	300	25	Highway Limit
(a) Island Princess '75	12	280	30	Highway Limit
PRINCESS OF VANCOUVER	18	987	286	4.79
QUADRA QUEEN II	11	200	30	4.57
QUINITSA	12	294	50	Highway Limit
TACHEK (a) Texada Queen '77	11	150	30	4.57
TENAKA (a) Comox Queen '77	12	100	18	4.26

Source: Ministry of Transporation and Highways.

APPENDIX D-3

COMMERCIAL VEHICLE CAPACITY OF B.C. FERRY VESSELS

- Cowichan Class

- Queen of Cowichan		
- Queen of Coquitlam	}	3 traffic lanes @ 122 m = 366 m
- Queen of Oak Bay		Clearance: 4.88 m
- Queen of Surrey		

- Alberni Class

- Queen of Alberni	}	7 traffic lanes = 701 m

- Vancouver Class

- Queen of Vancouver	}	6 traffic lanes @ 114 m = 684 m
- Queen of Victoria		Clearance: 4.42 m

- Esquimalt Class

- Queen of Esquimalt	}	6 traffic lanes @ 114 m = 684 m
- Queen of Saanich		Clearance: 4.33 m

Source: B.C. Ferries Corporation.

APPENDIX D-4

SUMMARY OF VEHICLE COMPOSITION ON FERRIES, SUMMER AVERAGE (SADT) AND AVERAGE DAILY TRAFFIC (ADT), 1980

Ferry		Vehicle Composition						
		Passenger Vehicles	Percent of Total	Trucks	Percent of Total	Buses	Percent of Total	Total Traffic*
a) Mainland Services								
Swartz Bay -	SADT	5,854	94.3	209	3.4	144	2.3	6,207
Tsawwassen	ADT	3,807	93.0	203	5.0	84	2.1	4,093
Departure Bay -	SADT	5,050	95.2	207	3.9	45	0.9	5,302
Horseshoe Bay	ADT	3,216	92.9	210	6.1	35	1.0	3,461
Port Hardy -	SADT	99	97.1	2	2.0	1	1.0	102
Prince Rupert	ADT	43	95.6	2	4.4	<1		45
Comox -	SADT	405	96.7	13	3.1	<1	0.2	419
Powell River	ADT	251	96.2	9	3.4	<1	0.4	261
b) International Services								
Victoria -	SADT	736	97.4	15	2.0	4	0.6	756
Port Angeles	ADT	309	94.8	15	4.6	2	0.6	326
Victoria -	SADT	NOT AVAILABLE						
Seattle	ADT							
Sidney -	SADT	177	81.6	41**	18.4**	N/A	N/A	217
Anacortes	ADT	86	86.9	13**	13.1**	N/A	N/A	99
c) Coastal Ferries								
Brentwood Bay -	SADT	271	99.6	2	0.4	<1	0.4	272
Mill Bay	ADT	196	99.0	2	1.0	<1	0.5	198
Swartz Bay -	SADT	353	97.8	8	2.2	<1	0.3	361
Saltspring Is.	ADT	287	97.6	7	2.4	<1	0.3	294
Swartz Bay -	SADT	361	96.0	14	3.7	<1	0.3	376
Outer Gulf Is.	ADT	278	96.2	11	3.8	<1	0.4	289
Crofton -	SADT	364	96.8	12	3.2	1	0.3	376
Saltspring Is.	ADT	289	96.7	10	3.3	<1	0.3	299
Chemainus -	SADT	207	96.3	8	3.7	0	-	215
Thetis/Kuper Is.	ADT	167	96.5	6	3.5	<1	0.6	173
Nanaimo -	SADT	924	97.1	25	2.6	3	0.3	952
Gabriola Is.	ADT	781	97.0	22	2.7	2	0.2	805
Vancouver Is. (French Creek) -	SADT	PASSENGERS ONLY						
Lasqueti Is.	ADT							
Vancouver Is. (Buckley Bay) -	SADT	789	96.5	20	2.4	9	1.1	818
Denman Is.	ADT	494	95.9	17	3.3	4	0.8	515
Campbell River -	SADT	1,129	96.0	46	3.9	0	-	1,176
Quadra Is.	ADT	768	96.2	30	3.8	<1	0.1	798
Port McNeill -	SADT	171	91.0	16	8.5	1	0.5	188
Alert Bay	ADT	164	91.6	14	7.8	1	0.6	179
Hornby Island	SADT	456	97.0	11	2.3	4	0.9	470
Denman Is.	ADT	237	96.3	7	2.8	1	0.4	246
Cortes Is. -	SADT	121	93.8	6	4.7	1	0.8	129
Quadra Is.	ADT	80	95.2	4	4.8	<1	1.1	84
d) Coastal Freighters								
Port Alberni -	SADT	PASSENGERS AND FREIGHT ONLY						
Ucluelet/Bamfield	ADT							
Gold River -	SADT	PASSENGERS AND FREIGHT ONLY						
Tahsis	ADT							
Tofino -	SADT	FREIGHT ONLY						
Hot Springs	ADT							

Source: B.C. Ferries, Ministry of Transportation and Highways,
Washington State Ferries, Black Ball Transportation Inc.

* Total traffic, both directions.
** Includes trucks and buses.

APPENDIX D-5

SUMMARY OF TOTAL VEHICLES CARRIED* BY MONTH (1980) ON FERRY SERVICES

Ferry	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
a) Mainland Services												
Swartz Bay - Tsawwassen	79,648	86,971	102,697	115,625	130,253	139,484	188,679	196,173	140,044	120,950	98,973	98,483
Departure Bay - Horseshoe Bay	66,385	73,419	85,181	97,060	106,526	115,311	157,708	171,015	120,041	106,117	83,387	84,440
Port Hardy - Prince Rupert	879	675	952	124	63	2,370	3,121	3,172	2,001	1,303	864	1,068
Comox - Powell River	4,712	5,362	6,632	7,595	7,867	8,618	12,033	13,924	8,852	7,856	6,285	5,722
b) International Services												
Sidney - Anacortes	708	1,070	1,684	1,352	3,069	4,274	4,411	9,047	5,682	2,686	1,299	1,102
Victoria - Port Angeles	1,638	484**	4,143	5,970	9,782	13,530	22,628	24,244	15,983	7,496	3,954	2,232
Victoria - Seattle	NOT AVAILABLE											
c) Coastal Ferries												
Brentwood Bay - Mill Bay	4,008	4,537	5,438	6,162	6,930	6,854	8,389	8,497	7,146	6,344	5,260	2,805
Swartz Bay - Saltspring Is.	6,314	7,290	8,316	8,755	9,552	9,491	11,087	11,317	9,285	9,651	8,624	8,027
Swartz Bay - Outer Gulf Is.	6,318	6,818	7,719	8,642	10,031	9,656	11,495	11,808	9,224	9,158	8,085	6,955
Crofton - Saltspring Is.	6,224	7,088	8,564	9,083	10,140	9,791	11,530	11,804	9,636	9,976	8,306	7,432
Chemainus - Thetis/Kuper Is.	4,151	4,811	4,956	4,753	5,648	5,370	6,500	6,821	5,593	5,396	5,017	4,302
Nanaimo - Gabriola Is.	20,039	21,845	24,254	26,148	27,228	26,167	29,395	29,603	25,366	22,350	21,886	20,235
French Creek - Lasqueti Is.	PASSENGERS ONLY											
Buckley Bay - Denman Is.	9,981	11,116	13,083	14,745	16,845	17,456	23,891	26,818	17,049	14,343	12,312	10,743
Campbell River - Quadra Is.	17,942	19,115	20,731	21,918	26,543	30,081	35,475	37,408	23,366	22,068	19,587	17,887
Port McNeill - Alert Bay	4,137	4,750	5,050	8,702	5,131	5,261	5,513	6,149	5,576	5,482	4,862	4,848
Hornby Is. - Denman Is.	4,111	4,609	5,374	6,430	8,689	8,565	13,601	15,566	7,802	6,202	4,828	4,077
Cortes Is. - Quadra Is.	1,682	1,869	1,983	2,569	2,752	2,807	3,860	4,119	2,524	2,497	2,291	1,926
d) Coastal Freighters												
Port Alberni - Ucluelet/Bamfield	PASSENGERS AND FREIGHT ONLY											
Gold River - Tahsis	PASSENGERS AND FREIGHT ONLY											
Tofino - Hot Springs	FREIGHT ONLY											

* Total traffic, both directions.

** Out of service - February 3 - 24

Source: B.C. Ferries, Ministry of Transportation and Highways,
Washington State Ferries, Black Ball Transportation Inc.

APPENDIX D-6

SUMMARY OF VEHICLES CARRIED BY YEAR ON FERRY SERVICES

SUMMER AVERAGE DAILY TRAFFIC*

Ferry	1975	1976	1977	1978	1979	1980	1981
a) Mainland Services							
Swartz Bay - Tsawwassen	4,985	4,027	4,872	5,591	5,638	6,207	6,473
Departure Bay - Horseshoe Bay	4,395	3,306	4,026	4,432	4,968	5,302	5,831
Port Hardy - Prince Rupert	89	80	85	86	91	102	128
Comox - Powell River	355	199	257	295	362	419	426
b) International Services							
Sidney - Anacortes	-	-	-	-	-	217	420
Victoria - Port Angeles	790	799	804	793	726	756	791
Victoria - Seattle			NOT AVAILABLE				
c) Coastal Ferries							
Brentwood Bay - Mill Bay	251	138	191	228	257	272	263
Swartz Bay - Saltspring Is.	252	210	240	264	292	361	371
Swartz Bay - Outer Gulf Is.	125	105	125	126	291	376	423
Crofton - Saltspring Is.	347	238	275	298	336	376	383
Chemainus - Thetis/Kuper Is.	133	133	157	175	192	215	211
Nanaimo - Garbriola Is.	533	456	601	756	882	952	972
French Creek - Lasqueti Is.			PASSENGERS ONLY				
Buckley Bay - Denman Is.	556	540	635	669	740	818	907
Campbell River - Quadra Is.	706	674	688	722	766	1,176	1,158
Port McNeill - Alert Bay	88	98	114	132	180	188	213
Hornby Island - Denman Is.	321	293	346	387	436	470	516
Cortes Is. - Quadra Is.	85	80	89	99	108	129	135
d) Coastal Freighters							
Port Alberni - Ucluelet/Bamfield	PASSENGERS AND FREIGHT ONLY						
Gold River - Tahsis	PASSENGERS AND FREIGHT ONLY						
Tofino - Hot Springs			FREIGHT ONLY				

* Total traffic, both directions.

Source: B.C. Ferries, Ministry of Transportation and Highways,
Washington State Ferries, Black Ball Transportation Inc.

APPENDIX D-7

SUMMARY OF TOTAL PASSENGERS CARRIED* BY MONTH (1980) ON FERRY SERVICES

Ferry	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
a) Mainland Services												
Swartz Bay - Tsawwassen	232,608	245,760	306,859	365,941	426,498	466,848	683,570	733,841	429,839	359,621	279,647	305,418
Departure Bay - Horseshoe Bay	171,795	182,783	220,505	257,292	279,029	296,457	436,398	495,960	286,523	261,656	209,290	232,339
Port Hardy - Prince Rupert	3,203	2,314	3,886	489	169	8,244	11,705	12,388	6,991	4,448	2,740	4,154
Comox - Powell River	17,093	19,280	23,838	27,108	28,446	30,627	42,868	48,795	28,584	26,916	22,066	20,713
b) International Services												
Sidney - Anacortes	1,470	1,999	3,725	2,741	8,703	12,023	15,762	29,196	14,122	5,357	2,680	2,570
Victoria - Port Angeles	5,777	1,417**	15,167	22,386	41,932	53,740	94,868	107,494	51,814	24,062	13,481	8,703
Victoria - Seattle						NOT AVAILABLE						
c) Coastal Ferries												
Brentwood Bay - Mill Bay	7,763	8,516	11,151	12,619	14,891	14,828	19,625	17,755	14,085	12,510	10,364	6,535
Swartz Bay - Saltspring Is.	12,582	14,740	17,163	18,669	21,087	20,773	25,627	27,048	18,781	19,599	17,240	16,628
Swartz Bay - Outer Gulf Is.	13,340	14,254	17,297	20,966	25,068	23,936	31,709	31,326	21,026	20,318	17,170	15,573
Crofton - Saltspring Is.	13,658	15,565	18,142	19,617	22,835	23,007	25,102	26,368	19,070	19,165	16,752	15,530
Chemainus - Thetis Is.	13,613	16,567	18,862	18,065	18,838	18,787	21,972	26,365	20,363	21,099	17,297	13,408
Nanaimo - Gabriola Is.	47,490	50,049	55,972	62,675	63,877	59,936	72,591	78,518	60,736	59,578	51,755	48,358
French Creek - Lasqueti Is.	821	780	1,076	1,413	1,719	1,687	1,799	2,122	1,504	1,723	1,338	1,229
Buckley Bay - Denman Is.	22,643	24,810	26,447	30,566	37,277	38,496	54,158	64,381	36,016	31,023	24,518	21,826
Campbell River - Quadra Is.	37,780	40,722	45,567	49,168	57,358	62,240	73,698	81,117	54,994	52,739	45,237	43,887
Port McNeill - Alert Bay	13,058	15,123	16,741	17,715	18,720	20,237	19,182	22,816	18,812	18,515	16,951	17,363
Hornby Is. - Denman Is.	9,440	9,969	12,184	14,938	20,460	20,438	32,811	37,677	17,586	14,146	10,617	9,158
Cortes Is. - Quadra Is.	3,457	3,672	3,955	5,438	6,652	6,216	9,164	9,903	5,464	5,349	4,908	4,828
d) Coastal Freighters												
Port Alberni - Ucluelet/Bamfield	115	126	240	371	629	1,382	2,344	2,815	1,464	371	121	116
Gold River - Tahsis						NOT AVAILABLE						
Tofino - Hot Springs						NO PASSENGERS, FREIGHT ONLY						

* Including drivers of vehicles. Total traffic, both directions.
** Out of service - February 3 - 24

Source: B.C. Ferries, Ministry of Transportation and Highways,
Washington State Ferries, Black Ball Transportation Inc.

APPENDIX D-8

SUMMARY OF PASSENGERS CARRIED BY YEAR ON FERRY SERVICES

Ferry	Summer Average Daily Traffic* Per Year						
	1975	1976	1977	1978	1979	1980	1981
a) Mainland Services							
Swartz Bay - Tsawwassen	18,441	15,234	17,621	20,222	21,117	22,861	22,990
Departure Bay - Horseshoe Bay	12,533	9,578	11,841	12,790	14,107	15,038	16,127
Port Hardy - Prince Rupert	367	304	316	347	382	389	449
Comox - Powell River	1,325	781	968	1,082	1,303	1,478	1,159
b) International Services							
Sidney - Anacortes	-	-	-	-	-	725	1,361
Victoria - Port Angeles	3,482	3,685	3,804	3,961	3,149	3,264	3,457
Victoria - Seattle			NOT AVAILABLE				
c) Coastal Ferries							
Brentwood Bay - Mill Bay	N/A	N/A	484	564	641	603	619
Swartz Bay - Saltspring Is.	602	500	563	628	692	850	862
Swartz Bay - Outer Gulf Is.	390	287	347	375	846	1,017	1,090
Crofton - Saltspring Is.	777	488	603	686	823	830	893
Chemainus - Thetis/Kuper Is.	565	518	582	612	617	780	640
Nanaimo - Gabriola Is.	1,732	1,377	1,796	1,964	2,345	2,437	2,487
French Creek - Lasqueti Is.	59	61	70	62	64	63	85
Buckley Bay - Denman Is.	1,209	1,180	1,521	1,606	1,806	1,912	2,187
Campbell River - Quadra Is.	1,776	1,645	1,654	1,806	1,877	2,497	3,110
Port McNeill - Alert Bay	397	312	365	406	596	677	772
Hornby Is. - Denman Is.	812	660	833	901	1,061	1,137	1,284
Cortes Is. - Quadra Is.	218	201	206	230	241	308	336
d) Coastal Freighters							
Port Alberni - Ucluelet/Bamfield	N/A	N/A	N/A	N/A	N/A	83	N/A
Gold River - Tahsis			NOT AVAILABLE				
Tofino - Hot Springs	NO PASSENGERS, FREIGHT ONLY						

* Including drivers of vehicles. Total traffic, both directions.
Source: B.C. Ferries, Ministry of Transportation and Highways,
Washington State Ferries, Black Ball Transportation Inc.

APPENDIX E-1

INVENTORY OF BUS VEHICLES; 1982

1. PCL Vehicles (PCL Series Nos.)	Number in Service	Seating Capacity
4200	1	43
4300A	3	43
4300AL	3	41
4500AL	19	47
4800AL	7	47
6300	1	41
6500	30	41-43
6600	5	43
6700A	30	47
6700AL	16	53
	115	
2. OSL Vehicles		
Buses	1	33
	1	37
Van	1	11
	3	

Source: Pacific Coach Lines, Orient Stage Lines.

APPENDIX E-2

ALLOCATION OF BUS VEHICLES BY NETWORK COMPONENT; 1982

Network Component	Vehicle Allocation (PCL Series Nos.)
• Vancouver-Victoria	4800/6500/6700
• Vancouver-Nanaimo	4500/4800/6500/6700/6600
• Victoria-Nanaimo	4300/4500/4800/6500
• Port Alberni (PCL) Services	4500/4800
• Campbell River (PCL) Services	4300/4500/4800

- All OSL Services allocated to Pt. Alberni - Tofino/Ucluelet

Source: Pacific Coach Lines, Orient Stage Lines.

APPENDIX E-3

SUMMARY OF BUS PASSENGER VOLUMES BY MONTH, 1980 & 1981
(Scheduled Services Only)

ROUTE		Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Victoria-Vancouver	1980	47,108	43,147	51,749	64,602	71,197	72,940	104,824	121,606	77,295	62,023	46,555	57,218
	1981	44,301	41,268	49,229	61,586	67,168	64,598	90,629	93,588	68,326	51,640	41,768	48,418
Nanaimo-Vancouver	1980	28,154	26,315	30,077	35,714	33,316	31,806	42,681	57,356	33,001	33,527	27,400	36,190
	1981	30,357	24,644	27,026	34,463	31,567	31,059	41,205	39,453	33,733	29,894	25,577	32,311
Victoria-Nanaimo	1980	20,364	18,429	20,326	21,269	21,974	20,558	24,293	27,768	21,616	22,562	21,704	23,610
	1981	20,989	18,147	19,991	21,698	21,537	22,440	24,926	23,912	22,453	22,396	20,406	24,578
Nanaimo-Campbell River	1980	13,560	11,554	13,280	13,969	13,482	14,456	18,441	22,260	14,913	15,291	12,516	15,810
	1981	13,409	11,339	13,438	16,262	14,818	14,595	19,325	19,065	15,635	14,825	13,247	16,977
Nanaimo-Port Alberni	1980	5,704	5,544	5,709	6,097	5,816	6,383	8,311	8,790	5,875	5,739	5,306	6,603
	1981	5,249	4,613	4,952	5,797	5,615	6,317	7,670	7,202	6,122	5,393	4,475	6,344
Campbell River-Port Hardy	1980	1,184	890	1,116	1,088	924	1,834	2,479	3,061	1,130	1,110	1,059	1,338
	1981	1,032	958	1,070	1,815	1,426	2,105	2,559	2,943	2,401	1,175	1,091	1,494
Port Alberni-Tofino/Ucluelet	1980	487	393	506	660	659	811	1,064	1,308	751	599	375	459
	1981	352	399	478	619	544	667	901	1,145	798	509	371	547

Source: Pacific Coach Lines, Orient Stage Lines.

APPENDIX E-4

SUMMARY OF MONTHLY BUS PASSENGER VOLUMES, 1976-1982

Route	Average Monthly Bus Passenger Volumes (Both Directions)							
	1975	1976	1977	1978	1979	1980	1981	1982
Victoria-Vancouver	-	-	-	-	69,800	68,400	60,200	55,500
Nanaimo-Vancouver	-	-	-	-	32,100	34,600	31,800	28,300
Victoria-Nanaimo	-	-	19,700	18,100	19,000	22,000	22,000	22,400
Nanaimo-Campbell River	-	-	11,110	11,370	13,700	15,000	15,200	14,670
Nanaimo-Port Alberni	-	-	-	-	6,370	6,300	5,800	4,890
Campbell River-Port Hardy	-	-	-	-	1,680	1,430	1,670	1,820
Port Albernia-Tofino/Ucluelet	390	520	670	590	780	670	610	740

Source: Pacific Coach Lines, Orient Stage Lines.

APPENDIX E-5

SUMMARY OF AVERAGE DAILY BUS PASSENGER VOLUMES, 1976-1982

Route	Summer Average Daily Pas[illegible] Traffic (Both Directi[illegible]						
	1976	1977	1978	1979	1980	1981	1982
Victoria - Vancouver	-	-	-	3,462	3,652	2,971	2,421
Nanaimo - Vancouver	-	-	-	1,459	1,614	1,301	1,131
Victoria - Nanaimo	-	830	666	723	840	788	802
Nanaimo - Campbell River	-	491	524	588	656	619	597
Nanaimo - Port Alberni	-	-	-	273	276	240	183
Campbell River - Port Hardy	-	-	-	89	89	89	95
Port Alberni - Tofino/Ucluelet	23	27	28	35	38	33	37

Source: Pacific Coach Lines, Orient Stage Lines.

APPENDIX E-6

SUMMARY OF COMMERCIAL VEHICLE TRAFFIC ON B.C. FERRIES, 1975-1981

		Summer Average Daily Traffic (Both Directions)						
Route		1975	1976	1977	1978	1979	1980	1981
Swartz Bay - Tsawwassen	Pass. Vehs.	4,714	3,792	4,614	5,307	5,332	5,854	6,151
	Trucks	152	131	151	159	171	209	190
	Buses	120	103	107	125	135	144	132
	Total	4,985	4,027	4,872	5,591	5,638	6,207	6,473
Departure Bay - Horseshoe Bay	Pass. Vehs.	4,200	3,112	3,835	4,224	4,728	5,050	5,574
	Trucks	144	146	146	165	198	207	213
	Buses	51	48	45	43	42	45	44
	Total	4,395	3,306	4,026	4,432	4,968	5,302	5,831
Comox - Powell River	Pass. Vehs.	250	157	209	239	290	405	416
	Trucks	105	41	48	55	71	13	10
	Buses	0	0	0	0	1	1	1
	Total	355	199	257	295	362	419	426

Source: B.C. Ferries.

APPENDIX E-7

COMMENTS FROM TRUCKING FIRMS

The survey of trucking companies serving Vancouver Island also revealed particular operating problems of these organizations and the constraints that are felt to be in evidence by some companies due to present levels of service offered by marine carriers to the Island; namely CP and CN Marine (the latter was not operational in 1980), and B.C. Ferries. The most common comments were as follows:

- CP/CN operate a "drop trailer" service and accept reservations. B.C. Ferries operate a "roll-on/roll-off" service on a "first come/first served" basis. Some trucking companies would like to make greater use of B.C. Ferry services (because of its cheaper rates, more attractive schedule, and faster crossing time). However, B.C. Ferries will not allow dropped trailers, which makes the barge services more cost-effective for the trucking industry. The trucking companies suggested that B.C. Ferries operate a commercial vehicle trailer service on its last run of the day, turning one complete level over to commercial vehicles only. Also, they suggested that B.C. Ferries consider operating a drop trailer service during the hours of 10 p.m. - 6 a.m.

- Some truckers had adverse comments regarding congestion at B.C. Ferry terminals during summer months.

- Some truckers had adverse comments regarding the limited sailing schedule of CP Marine services, with the result that carriers are required to use B.C. Ferry services in order to achieve delivery times required by Island clients.

- Some truckers expressed concerns that a number of truckers are operating on Vancouver Island without authority and are undercutting established freight rates.

It was not possible in the course of the current study to fully investigate the concerns expressed by some of the trucking companies. It would be useful to know how widespread these concerns are, what the ferry operators' responses might be, and the extent to which these concerns represent significant operational problems for truckers.

APPENDIX F-1

COMPARISON OF SOME PHYSICAL CHARACTERISTICS OF THE E&N RAILWAY SUBDIVISIONS

	Victoria to Courtenay	Parksville to Port Alberni	Duncan to Lake Cowichan
Track length	224 km.	61 km.	29 km.
Maximum elevation	279 m.	392 m.	241 m.
Maximum grade	1.74% northbound 1.48% southbound	2.2% westbound 1.5% eastbound	2.0% westbound 1.0% eastbound
Sharpest curve	10 degrees	16 degrees	11 degrees
Longest trestle	319 m.	147 m.	101 m.
Highest trestle	79 m.	31 m.	N/A
Total number of trestles	53	23	4
Longest tunnel	102 m.	-	-
Total number of tunnels	2	0	0

Source: Description of Esquimalt and Nanaimo Railway Line, March 1982.

N/A = Not Available

APPENDIX F-2

RAILWAY FACILITIES OF THE E&N RAILWAY

	Siding Capacity (Cars)	Yard Capacity (Cars)	Comments
Victoria-Courtenay			
Courtenay	22	-	
Mud Bay	19	-	
Dunsmuir	15	-	
Qualicum Beach	25	-	
Parksville	13	30	Water tank (10,000 gal)
Bryn	19	-	
Jayem	20	-	
Wellington	17	-	
Wellcox	-	233	Diesel fueling station (21,000 gal). Car barge ferry slip.
Stockett	17	-	
Cassidy	14	-	
Velco	-	-	Track connections with M&B Yard and Comox Logging & Railway Co.
Ladysmith	14	70	
Chemainus	20	-	Track connections with M&B Yard
Crofthill	-	-	Track connections with B.C. Forest Products.
Hayward	21	-	
Koksilah	19	-	
Cobblehill	26	-	
Malahat	20	-	
Langford	18	-	
Esquimalt	35	10	
Russells	-	215	Diesel fueling station (8,860 gal) Railway Shop & Stores 10-Stall Roundhouse, 70 ft. turntable.
Subtotal	354	558	
Port Alberni-Parksville			
Cameron Lake	26	-	
Locharkaig	13	-	
Arrowsmith	16	-	
Port Alberni	-	-	2-Stall Enginehouse
Subtotal	55	-	
Lake Cowichan-Duncan			
Sahtlam	22	-	
Lake Cowichan	-	-	Track connections with Pacific Logging & Railway, a subsidiary of E&N
Subtotal	22	-	
TOTAL	431	558	

Source: Description of Esquimalt & Nanaimo Railway Line, March 1982.

APPENDIX F-3

COMPARISON OF SOME PHYSICAL CHARACTERISTICS OF THE C.N.R. SUBDIVISIONS

	Deerholme to Youbou	Deerholme to Cowichan Bay
Track length	39 km.	10 km.
Maximum elevation	N/A	N/A
Maximum grade	1.5% westbound	2.2% westbound
1.5% eastbound	1.5% eastbound	2.2% eastbound
Sharpest curve	12 degrees	10 degrees
Longest trestle	175 m.	240 m.
Highest trestle	N/A	N/A
Number of trestles	13	7
Longest tunnel	-	-
Number of tunnels	0	0

Source: Canadian National Railways.

APPENDIX F-4

TRAIN PASSENGER LOADINGS - E & N RAILWAY

(July/August 1982)

Station	Northbound			Southbound		
	Boarded	Disembarked	Total Still on Train	Boarded	Disembarked	Total Still on Train
Victoria	4138	-	4138	-	4112	0
Esquimalt	5	-	4143	-	6	4112
Langford	380	3	4520	-	393	4118
Malahat	-	-	4520	-	1	4511
Cliffside	-	-	4520	-	-	4512
Strathcona	5	37	4488	2	2	4512
Shawnigan	92	116	4464	165	73	4512
Cobble Hill	24	11	4477	16	27	4420
Hillbank	-	2	4475	2	1	4431
Cowichan	2	46	4431	41	7	4430
Duncan	315	337	4409	243	317	4396
Chemainus	33	27	4415	17	19	4470
Ladysmith	40	55	4400	76	59	4472
Cassidy	2	2	4400	-	7	4455
South Wellington	-	7	4393	2	1	4462
Sardis	1	1	4393	3	-	4461
Nanaimo	323	940	3776	974	295	4458
Wellington	41	3	3814	7	35	3779
Nanoose Bay	3	11	3806	5	2	3807
Parksville	144	571	3379	580	121	3804
Qualicum Beach	111	823	2667	792	90	3345
Dunsmuir	-	42	2625	19	6	2643
Buckley Bay	12	30	2607	16	4	2630
Union Bay	-	27	2580	33	-	2618
Courtenay	-	2580	0	2585	-	2585
TOTAL HANDLED	5671			5578		

Source: Detailed Ticket Analysis Reports, July and August, 1982.

APPENDIX F-5

PASSENGER ORIGIN/DESTINATION MATRIX
E&N RAILWAY
(July to August, 1982)

	Victoria	Esquimalt	Langford	Malahat	Cliffside	Strathcona	Shawnigan	Cobble Hill	Hillbank	Cowichan	Duncan	Chemainus	Ladysmith	Cassidy	South Willington	Starks	Nanaimo	Willington	Nanoose Bay	Parksville	Qualicum Beach	Dunsmuir	Buckley Bay	Union Bay	Courtenay
Victoria			3			37	116	8	2	45	239	12	40	2		1	836	1	10	465	606	32	28	19	1636
Esquimalt											4														1
Langford								3		1	62	7	6		6		62			35	79	4	2	1	112
Malahat																									
Cliffside																									
Strathcona	2																1			4					
Shawnigan	159		6								27				1		12			16	9				27
Cobble Hill	16										5		1							3	1			1	13
Hillbank	2																								
Cowichan	40		1																						
Duncan	149	2	70				14	7	1			8	8				23	2		17	55				202
Chemainus	6		8							1	2						3			4	5				21
Ladysmith	66		5								5									4	2				34
Cassidy																									2
South Wellington	1						1																		
Starks											1		2				1								
Nanaimo	861	3	62				14	4		2	16		11	1					1	23	29	2		1	267
Wellington	5										2										36				5
Nanoose Bay	4																1				1				2
Parksville	451		48				18			4	15	2	7				35					4			140
Qualicum Beach	601		68			2	9	1			45	1	3				25	34		3				2	109
Dunsmuir	10		7								2														
Buckley Bay	10		2				3							1										3	9
Union Bay	25							2			4		2												
Courtenay	1704	1	116	1				14	13		225	16	34	5	1		234	1	2	118	90	6	4		

Source: Detailed Ticket Analysis Reports, July to August, 1982.

APPENDIX F-6

TRAIN PASSENGER LOADINGS - E & N RAILWAY

(8 months, Feb-Sept, 1982)

	Northbound			Southbound		
Station	Boarded	Disembarked	Total still on train	Boarded	Disembarked	Total still on train
Victoria	10,534	0	10,534	0	10,241	0
Esquimalt	28	29	10,533	0	28	10,241
Langford	1,167	48	11,652	2	1,047	10,269
Malahat	0	29	11,623	0	17	11,314
Cliffside	5	0	11,623	44	2	11,331
Strathcona	6	102	11,532	3	2	11,289
Shawnigan	283	423	11,392	385	236	11,288
Cobble Hill	88	52	11,428	52	86	11,139
Hillbank	8	6	11,430	2	3	11,173
Cowichan	18	69	11,379	60	35	11,174
Duncan	989	1,249	11,119	943	690	11,149
Chemainus	85	122	11,082	67	91	10,896
Ladysmith	237	368	10,951	199	232	10,920
Cassidy	5	6	10,950	10	8	10,953
South Willington	5	8	10,947	6	2	10,951
Starks	68	6	11,009	9	116	10,947
Nanaimo	1,217	2,239	9,987	2,250	654	11,054
Wellington	75	11	10,051	30	41	9,458
Nanoose Bay	14	26	10,039	14	64	9,469
Parksville	364	1,998	8,405	1,472	358	9,519
Qualicum Beach	313	1,836	6,882	1,789	196	8,405
Dunsmuir	17	90	6,809	46	7	6,812
Buckley Bay	14	149	6,674	169	58	6,773
Union Bay	33	94	6,613	67	0	6,662
Courtenay	0	6,613	0	6,595	0	6,595
TOTAL HANDLED		15,573			14,214	

Source: Detailed Ticket Analysis Reports February 1982 to September 1982.

APPENDIX F-7

PASSENGER ORIGIN/DESTINATION MATRIX

E&N RAILWAY

(8 months, Feb-Sept, 1982)

	Victoria	Esquimalt	Langford	Malahat	Cliffside	Strathcona	Shawnigan	Cobble Hill	Hillbank	Cowichan	Duncan	Chemainus	Ladysmith	Cassidy	South Willington	Starks	Nanaimo	Willington	Nanoose Bay	Parksville	Qualicum	Dunsmuir	Buckley Bay	Union Bay	Courtenay
Victoria		29	48	29		102	409	44	6	68	766	90	110	3	1	6	1741	6	18	1050	1425	58	81	72	4372
Esquimalt											14	3		2			3			1					5
Langford	2						14	8		1	341	16	10	1	6		157	3	6	72	152	10	5	3	362
Malahat																									
Cliffside	44										4									1					
Strathcona	3										1						1			4					
Shawnigan	361		24								88		5		1		51		1	59	21			1	56
Cobble Hill	49		3								32		3				8			9	6			1	29
Hillbank	2										1	1	3				3								
Cowichan	54	1	5								2	3					3				5				5
Duncan	631	9	195	16	1		56	32	2	1		9	237				119	2		108	96		5	3	410
Chemainus	31	4	13							8	11						10			6	16				53
Ladysmith	146		20								33						138			7	27				65
Cassidy	8	1	1																						5
South Willington	2						1				3						4						1		
Starks	4		2								1		2				1			67					
Nanaimo	1842	7	148				46	10		6	69	1	119	1	1				1	614	51	18	4	9	520
Willington	15		8								2						5				36				39
Nanoose Bay	10		2				1										1				1				13
Parksville	1066		80		1		58	8		6	90	5	14			81	63					4			360
Qualicum Beach	1408	2	134			2	20	5	1	7	61	13	29			2	64	34		7	2		53	2	258
Dunsmuir	33		11								2														17
Buckley Bay	64		16				3				1			1			2		50		32			3	11
Union Bay	51		1					2			6	3	2				2								33
Courtenay	4415	4	384	1			51	29		7	411	69	66	6	1	33	517	7	14	351	164	7	58		

Source: Detailed Ticket Analysis Reports, February 1982 to September 1982.

APPENDIX F-8

MONTHLY PASSENGERS HANDLED ON THE E & N RAILWAY

1979-1982

	Southbound Train				Northbound Train			
	1979	1980	1981	1982	1979	1980	1981	1982
Jan	1,638	1,152	929	1,069	1,347	981	821	923
Feb	1,554	908	940	1,016	1,195	977	929	912
Mar	2,575	1,357	1,263	1,097	2,689	1,305	1,275	1,104
Apr	2,307	2,043	1,626	1,697	2,067	2,192	1,671	1,806
May	2,318	2,702	2,034	1,888	2,715	2,739	2,442	1,925
Jun	3,016	2,525	2,506	3,236	4,384	3,947	3,832	2,091
Jul	3,832	3,417	3,174	2,564	3,623	3,270	3,298	2,639
Aug	4,021	3,816	3,352	3,034	3,983	4,085	3,571	2,971
Sept	2,227	1,989	1,513	1,594	2,096	1,848	1,539	1,467
Oct	1,575	1,811	1,189	N/A	1,551	1,799	1,105	N/A
Nov	1,284	958	724	N/A	1,112	894	725	N/A
Dec	902	1,255	1,091	N/A	900	1,308	1,139	N/A
TOTAL	27,249	23,933	29,341	N/A	27,662	25,345	22,347	N/A

Source: CP Rail Leaving and Handling Reports, January 1981, Montreal
VIA Rail Leaving and Handling Reports, November 1982.

APPENDIX G-1

PASSENGER MOVEMENTS AT MAJOR AIRPORTS

	1976	1977	1978	1979	1980
Victoria International	434,200	463,900	508,300	565,200	608,200
Campbell River	44,700	48,800	53,600	58,500	82,400
Nanaimo (Cassidy	N/A	N/A	N/A	N/A	68,300
Port Hardy	66,000	70,800	74,100	63,200	60,300
Comox	N/A	N/A	N/A	N/A	40,000
Tofino	2,700	2,900	2,500	2,300	1,300
Victoria Harbour*	91,600	104,300	78,600	108,500	93,300
Nanaimo Harbour*	50,100	49,100	33,600	44,500	48,600
TOTAL	689,300	739,800	750,700	842,200	894,100

Source: Enplaned and Deplaned Statement 37, ASC 1980. Published September, 1982 Director of Statistics & Forecasts (Air).

Annual Reports of Aircraft Movement Statistics, ASC.

*Prolonged labour disputes at Airwest Airlines Ltd. (forerunner of Air B.C.) seriously reduced passenger traffic counts at Victoria and Nanaimo harbours.

APPENDIX G-2

AIRCRAFT MOVEMENTS AT MAJOR AIRPORTS

	1976	1977	1978	1979	1980	1981
Air Carrier + Commercial Only						
Victoria International	49,800	56,000	59,100	62,500	57,200	60,600
Campbell River	4,000	5,700	3,200	6,700	9,100	10,000
Port Hardy	8,100	7,500	11,600	12,400	14,800	12,400
Tofino	1,400	1,100	1,000	800	900	1,400
TOTAL	63,300	70,300	74,900	82,400	82,000	84,400
Total Aircraft						
Victoria International	186,200	178,700	190,100	200,200	179,400	187,600
Campbell River	10,800	36,200	27,600	23,500	27,700	32,600
Port Hardy	15,700	14,300	25,400	19,200	27,300	23,200
Tofino	2,900	2,700	2,900	2,300	2,500	3,900
TOTAL	215,600	231,900	246,000	245,200	236,900	247,300

Source: Enplaned and Deplaned Statement 37, ASC 1980. Published September, 1982 Director of Statistics & Forecasts (Air).

Annual Reports of Aircraft Movement Statistics, ASC.

APPENDIX G-3

CARGO MOVEMENTS AT MAJOR AIRPORTS ON VANCOUVER ISLAND

(Metric Tonnes)

	1976	1977	1978	1979	1980
VICTORIA INTERNATIONAL					
General Cargo	996.6	1,138.1	1,359.4	1,356.7	1,435.8
Mail	641.4	781.5	757.0	814.2	925.9
Total	1,638.0	1,919.6	2,116.4	2,170.9	2,361.7
CAMPBELL RIVER					
General Cargo	134.9	141.8	220.0	264.2	222.9
Mail	15.2	22.4	26.7	1.5	0.2
Total	150.1	164.2	246.7	265.7	223.1
PORT HARDY					
General Cargo	690.4	836.3	688.1	510.3	549.8
Mail	93.3	103.8	92.6	101.6	72.4
Total	783.7	940.1	780.7	611.9	622.2
COMOX					
General Cargo	169.7	155.1	254.7	303.3	286.4
Mail	16.2	36.0	26.7	0.9	0.1
Total	185.9	191.1	281.4	304.2	286.5
TOTAL					
General Cargo	1,991.6	2,271.3	2,522.2	2,434.5	2,494.9
Mail	766.1	943.7	903.0	918.2	998.6
Total	2,757.7	3,215.0	3,425.2	3,352.7	3,493.5

Source: Air Carrier Traffic at Canadian Airports
Statistics Canada, 51-203 Annual
Aviation Statistics Centre

APPENDIX H-1

DESCRIPTION OF PUBLIC MARINE FACILITIES

(March 1982)

ALBERNI CLAYOQUOT	TYPE	ADMIN.	LOCAL REP.	CONDITION	SHED	CRANE	UTILITIES	SEAPLANE FLOAT	ROAD ACCESS	UPLANDS	APPROACH	COMMENTS
Ahousat	4	T.C.		Good*	X	X	L.		B'Walk		Vehicle	
"	2	S.C.H.							B'Walk		Walkway	
Bamfield East	4	T.C.	X	Good*	X		P.		X		Vehicle	
" East (Pt. Desire)	2	S.C.H.	X						X		Walkway	Launching ramp
Bamfield West	4	T.C.	X	Fair*	X	X			X		Vehicle	
" West (hospital)	2	T.C.	X	Fair*			W.	X	Path			
" West	2	S.C.H.	X									
Marktosis	3	S.C.H.			X	X			Path		Walkway	Vehicle rated wharfhead
Opitsat	3	S.C.H.				X			Path		Walkway	Adjacent Bulkhead
Tofino (1st St.)	4	T.C.		Good		X	L.	X	X		Vehicle	Truck loading ramp
" (4th St.)	3	S.C.H.	X	Good	Office	X	L.T.	X	X	X	Vehicle	Adjacent parking area
" (Armitage Pt.)	2	S.C.H.	X	Good		X	L.		X		Vehicle	
" (Wingen Lane)	2	S.C.H.	X	Good			L.		Path		Walkway	
Ucluelet East	2	S.C.H.		Good								
" East Ittatsoo	2	S.C.H.		Fair*								Subject to vessel wash
Ucluelet West	4	T.C.	X	Good	Office	X	L.T.	X	X		Vehicle	
" West (Otter St.)	2	S.C.H.	X	Fair			P.L.T.		Path		Walkway	
" West (Boat Harbour)	2	S.C.H.	X	Good	Office		P.W.L.T.		X	X	Walkway	Adjacent parking area, ramp
COWICHAN VALLEY												
Chemainus	3	T.C.	X	Fair*	X	X	P.L.		X		Vehicle	Extensive Floats
"	5	M.O.T.H.							X		Vehicle	
Cowichan Bay	3	S.C.H.	X	Good	Office	X	P.W.L.		X		Vehicle	Breakwater in poor condition, crane arm bent
Crofton	3	S.C.H.	X	Good*	X	X	P.L.		X		Vehicle	Harbour adjacent to ferry landing
"	5	B.C.F.			X		P.W.L.		X		Vehicle	Ferry access off wharf approach
Kuper Island	2	T.C.			X		L.		X		Vehicle	Includes fixed slip
" "	5	M.O.T.H.							X		Vehicle	
Ladysmith	4	T.C.	X	Good					X		Vehicle	Gravel Road
"	3	S.C.H.	X	Good	Office	X	P.W.L.		X		Vehicle	Large parking area, boat grid
Maple Bay	2	S.C.H.	X	Good*			L.		X		Walkway	
Mill Bay	2	S.C.H.	X	Fair*					X		Walkway	
" "	5	B.C.F.					P.L.		X		Vehicle	
Thetis Island	3	T.C.	X	Good*					X		Vehicle	Includes fixed slip
" "	5	M.O.T.H.					P.L.		X		Vehicle	

CAPITAL	TYPE	ADMIN.	LOCAL REP.	CONDITION	SHED	CRANE	UTILITIES	SEAPLANE FLOAT	ROAD ACCESS	UPLANDS	APPROACH	COMMENTS
Bedwell Harbour	2	S.C.H.							X		Walkway	Customs Office, Breakwater
Brentwood Bay	2	T.C.		Fair*			L.T.		Path		Walkway	
" "	2	S.C.H							X		Walkway	
" "	5	B.C.F.					P.W.L.T.		X		Vehicle	
Burgoyne Bay	2	S.C.H.	X						X		Walkway	Includes scow float
Fernwood (Walker Hook)	2	T.C.	X	Poor*	X				X		Walkway	
Fulford Harbour	4	T.C.	X	Fair*			T		X		Vehicle	
" "	2	S.C.H.					T		X		Walkway	
" "	5	B.C.F.					P.W.L.T.		X		Vehicle	
Ganges	4	T.C.	X	Fair*	X	X	L.	X	X		Vehicle	Moveable ramp
"	2	S.C.H.	X				P.W.L.F.		X		Walkway	Launching ramp, parking area
Hope Bay	3	S.C.H.					L.T.		X		Vehicle	
Horton Bay	2	S.C.H.	X						Path		Walkway	
Long Harbour	6	B.C.F.					P.W.L.		X		Vehicle	
Lyall Harbour (Saturna Is.)	4	T.C.			X				X		Vehicle	Attached fuel float
" " " "	5	B.C.F.					P.L.		X		Vehicle	
Mayne Island	3	T.C.	X	Fair*			L.	X	X		Vehicle	
Montague Harbour	2	T.C.		Fair*			L.T.		X		Walkway	
" "	6	B.C.F.					P.W.L.T.		X		Vehicle	
Musgrave	3	S.C.H.	X						X		Vehicle	
North Galiano	2	S.C.H.	X	Fair*					X		Walkway	
Otter Bay	5	B.C.F.					P.W.L.		X		Vehicle	
Piers Island	2	T.C.							Lane		Walkway	
Port Renfrew	4	T.C.		Fair*	X	X	P.W.L.		X		Vehicle	Fuel shed on wharf
Retreat Cove	2	S.C.H.							X		Walkway	
Saanichton	3	T.C.			X	X			X		Vehicle	
Sidney (Beacon Ave.)	3	S.C.H			X		P.W.L.T.		X		Vehicle	Customs Office
" (Ocean Ave.)	5						P.W.L.T.		X		Vehicle	Washington State Ferry
Sooke	3	S.C.H.	X			X	W.L.		X		Vehicle	
Sturdies Bay	3	T.C.		Fair*		X	P.		X		Vehicle	
" "	5	B.C.F.					P.W.L.T.		X		Vehicle	
Swartz Bay	2	T.C.							X		Walkway	

APPENDIX H-1 (Continued)

CAPITAL - Continued	TYPE	ADMIN.	LOCAL REP.	CONDITION	SHED	CRANE	UTILITIES	SEAPLANE FLOAT	ROAD ACCESS	UPLANDS	APPROACH	COMMENTS
Tsehum Harbour	3	S.C.H.	X			X	P.W.L.F.T.		X		Vehicle	Includes loading ramp
Vesuvius Bay	2	S.C.H.	X						X		Walkway	
" "	5	B.C.F.							X		Vehicle	
Village Bay	5	B.C.F.							X		Vehicle	
Whaler Bay	2	S.C.H.							X		Walkway	
MOUNT WADDINGTON												
Alert Bay	4	T.C.	X	Good	X	X	P.L.		X	No	Vehicle	
" "	2	S.C.H.	X	Good			P.W.L.F.		X	No	Vehicle	
" "	2	S.C.H	X	Poor				X	X	No	Vehicle	
" "	5	M.O.T.H.		Good					X	No	Vehicle	Abandoned ramp is for
Bull Harbour	1	S.C.H.										Water access only
Coal Harbour	4	T.C.		Fair	X	X	L.	X	X	No	Vehicle	
Jeune Landing	4	T.C.	X	Good	X		L.		X	No	Vehicle	Serves Port Alice
Mitchell Bay	2	S.C.H.	X	Fair*					X		Walkway	
Port Hardy	4	T.C.		Good	X		P.W.L.		X	No	Vehicle	
" "	3	S.C.H.	X	Good	Office	X	P.W.L.F.	X	X	No	Vehicle	
" "	5	B.C.F.					P.W.L.		X		Vehicle	Located at Bear Cove
Port McNeill	4	T.C.	X	Good	X	X	P.W.L.		X	No	Vehicle	Excellent combination facility
" "	2	S.C.H.	X	Good			P.W.L.F.	X	X	No	Vehicle	Adjacent boat grid
" "	5	M.O.T.H.		Good			P.L.				Vehicle	Access off
Quatsino	4	T.C.	X	Fair*	X	X	L.		X		Vehicle	
Sointula	4	T.C.		Fair	X		P.L.		X	No	Vehicle	Common approach with ferry landing
"	2	S.C.H.	X	Fair	Office	X	P.W.L.	X	X	No	Vehicle	
"	5	M.O.T.H.		Good	X		P.L.		X	No	Vehicle	Tight turn on approach
Winter Harbour	4	S.C.H.		Good	X	X		X	X	No	Vehicle	
COMOX-STRATHCONA												
Buckley Bay	5	M.O.T.H.		Good*			P.W.L.T.		X		Vehicle	
Campbell River	3	S.C.H.	X		Ser-vices		P.W.L.F.T.		X	X	Vehicle	Office between S.C.H. Loc'ns
" " (North)	3	S.C.H.					P.W.L.F.T.		X		Vehicle	
" " (South)	5	M.O.T.H.		Good			P.W.L.T.		X		Vehicle	
Comox	3	S.C.H.	X	Good	Office	X	P.W.L.F.T.		X	Yes	Vehicle	Adjacent boat grid
Courtenay Slough	2	S.C.H.	X	Good		X	W.L.		X		Vehicle	

COMOX-STRATHCONA (cont'd)	TYPE	ADMIN.	LOCAL REP.	CONDITION	SHED	CRANE	UTILITIES	SEAPLANE FLOAT	ROAD ACCESS	UPLANDS	APPROACH	COMMENTS
Denman Island (West)	3	S.C.H.		Poor*					X			*Condemned/Abandoned
" " (West)	5	M.O.T.H.							X		Vehicle	
Denman Island (East)	5	M.O.T.H.										
Esperanza	4	T.C.	X	Poor*			L.		Path		Walkway	
" Hospital	2	T.C.		Fair*	X		W.L.		X		Vehicle	
Fair Harbour	3	T.C.		Fair*	X	X			X	X	Vehicle	
Ford Cove	2	S.C.H	X			X			X		Walkway	
" "	5	M.O.T.H.					P.W.L.		X			
Gold River	4	T.C.	X	Fair*	X	X	P.L.T.	X	X	X	Vehicle	
Kelsey Bay	4	T.C.		Good	X	X	P.		X		Vehicle	
" "	3	S.C.H.		Good	Office				X		Vehicle	
" "	5	B.C.F.							X		Vehicle	
Kyuquot	4	T.C.		Fair*	X	X			Path	X	Vehicle	
Little River	6	M.O.T.H.					P.W.L.		X		Vehicle	
Tahsis	4	T.C.	X	Good*	X	X	L.		X		Vehicle	
" (Seaplane Landing)	2	T.C.	X	Good*				X	X		Walkway	Adjacent seaplane ramp
Union Bay	2	S.C.H.							X		Walkway	Abandoned
Zeballos	4	T.C.		Fair*	X		L.	X	X	X	Vehicle	
"	2	T.C.						X	X		Walkway	
"	2	S.C.H.	X				L.		X		Vehicle	
NANAIMO												
Degnen Bay	3	S.C.H.	X	Fair*		X	P.L.		X		Vehicle	Narrow road access
Gabriola	5	M.O.T.H.					P.W.L.T.		X		Vehicle	Adjacent landing float
Nanaimo	5	M.O.T.H.					P.W.L.T.		X		Vehicle	
Qualicum Beach/French Creek	2	S.C.H.	X			X	P.L.F.		X		Walkway	Adjacent ramp

Legend:

Utilities:	Power, Water, Light, Fire protection, Public Telephone	
Administration:	Transport Canada, Ministry of Transportation and Highways, B.C. Ferries, S.C.H.	
Facility Type:	1	Regional Centre operating as major service and distribution point for a regional district.
	2	Sub Regional Centre operating as a secondary service and distribution point for a regional district
	3	Resource Export Port functioning primarily as a direct export point for a major commodity
	4	Coastal Resource Port which consolidates resources for coastal shipment
	5	Major Marine Tourist Centre with a concentration of private marina facilities (1100 berths)
	5	Minor Marine Tourist Centre with a concentration of private marina facilities (100 berths)
	7	Ferry Terminal functioning primarily as a ferry landing
	8	Local Centre - none of the above
	9	Abandoned Facility - abandoned or in disrepair

Source: B.C. Marine Facilities Study; Reid, Crowther and Partners Ltd., March, 1982

APPENDIX H-2

ADDITIONAL FACILITY INFORMATION ON SELECTED PORTS

Port	No. Berths	Length	Draft	Comments
Port Alice	1	500-600 ft	N/A	Western Forest Products
Tahsis	1	N/A	35'	Accommodates 25-30,000 Dwt vessels
Gold River	1	N/A	35'	Accommodates 25-30,000 Dwt vessels
Campbell River	1	500 ft	32'	
	1	400 ft	30'	
Port Alberni	2	each 700 ft	33'	MacMillan Bloedel, with storage sheds
	1	900 ft	35'	Somass Sawmill
	2	CL 1050 ft	37'	Harbour Commission terminals #1 & 2, 5-ton and 30-ton cranes
	1	600 ft	40'	Harbour Commission terminal #3, 11 acre storage
	3	N/A	N/A	Wharves - B.C. Packers, Argyle Street, Water Street
	2	N/A	N/A	Docks - Shell Oil, Imperial Oil
Nanaimo	3	each 600 ft	35-38'	Harbour Commission berths, accommodate 49,000 Dwt vessels, 3 warehouses with 100,000 sq ft total space, 40 acres assembly area
	2	each 400 ft	38'	Harmac, accommodate 49,000 Dwt vessels
	1	700 ft	45'	New Duke Point berth, warehouse with 110,000 sq ft total space
	1*	700 ft	45'	Additional Duke Point berth planned for future with 120,000 sq ft warehouse space
	1	200 ft	15'	Coastwise assembly wharf
	1	N/A	N/A	B.C. Ferries
	1	320 ft	23'	C.P. Rail-truck trail/ferry ramp
	3	37-150 ft	7-28'	Wharves - Standard Oil, British American Oil, Imperial Oil
Crofton	3	each 700 ft	N/A	Stuart Channel wharves, 2 for pulp & newsprint, one for lumber, accommodate 49,000 Dwt vessels
Cowichan Bay	2	N/A	34'	Westcan Terminals, 25 acres assembly area
Victoria	4	N/A	37'	Westcan Terminals-Ogden Point, 10 acre assembly area
Rupert Inlet	1	N/A	N/A	Island Copper, accommodates 35,000 Dwt, storage area for 35,000 tons copper concentrate, rail barge loading
Port Hardy	1	N/A	N/A	B.C. Ferries

Source: Sailing Directions, B.C. Coast-South Portion, Vol. 1.
B.C. Marine Facilities Study, Reid, Crowther & Partners Ltd., March '82.

Legend: CL = Combined Length
N/A = Not Available
* = Proposed Development

APPENDIX H-3

MARINE SHIPMENTS BY COMMODITY TYPE (1980)

(metric tons)

Port	Forest Products	Mining and Construction	Petroleum	Consumer Related	Manufacturing and Other	Total
Port Hardy	45,565	-	26,723	-	18	72,306
Alert Bay	236,700	-	7,365	-	1,800	245,865
Port McNeill	259,467	563	18,349	-	913	279,292
Beaver Cove	1,732,240	17,366	-	-	1,565	1,751,171
Johnstone Strait	682,399	1,256	23,118	-	2,113	708,886
	2,956,371	19,185	75,555	-	6,409	3,057,520
Menzies Bay	35,337	-	-	-	124	35,461
East Coast	1,974,363	1,148,557	55,556	-	14,573	3,193,049
Campbell River	1,477,988	524,696	145,401	-	4,472	2,152,557
Courtenay	5,264	98,317	32,384	-	-	135,965
	3,492,952	1,771,570	233,341	-	19,169	5,517,032
Nanaimo	2,843,463	355,277	495,353	4,563	36,136	3,374,792
Ladysmith	290,979	1,782	-	-	87	292,848
Chemainus	609,290	-	-	-	-	609,290
Crofton	3,121,598	13,456	98,371	-	32,141	3,265,566
Cowichan Bay	357,214	16	9,851	-	-	367,081
Bamberton	-	132,950	15,916	-	-	148,866
	7,222,544	503,481	619,491	4,563	68,364	8,418,443
Sooke	68,920	-	770	-	-	69,690
Becher Bay	37,848	-	-	-	-	37,848
Esquimalt	222,028	-	3,683	-	1,361	227,072
Victoria	912,580	1,708,712	543,805	5,448	12,699	3,183,244
	1,241,376	1,708,712	548,258	5,448	14,060	3,517,854
Ucluelet	129,781	-	14,459	445	-	144,685
Port Alberni	1,542,848	8,164	69,741	2,048	15,567	1,638,368
West Coast-South	650,244	7,875	33,841	-	2,086	694,046
	2,322,873	16,039	118,041	2,493	17,653	2,477,099
Quatsino	4,899	9	15	-	6,808	11,371
Port Alice	443,604	259,180	66,013	-	58,961	827,758
West Coast-North	1,085,447	148	13,166	-	-	1,098,761
Zeballos	73,786	-	229	-	-	74,015
Tahsis	253,280	14,515	474	-	-	268,269
Gold River	593,715	5,177	20,860	-	34,900	654,652
	2,454,731	279,029	100,757	-	100,669	2,935,186
	19,690,847	4,298,016	1,695,443	12,504	226,324	25,923,134

Source: Statistics Canada: Cargo Tonnes Handled at Canadian Ports in International Shipping, Table B-13, 1980. Commodities Loaded at Canadian Ports in Coastwise Shipping, Table E-13, 1980.

APPENDIX H-4

MARINE SHIPMENTS BY COMMODITY TYPE
AND TYPE OF SHIPMENT (1980)
(metric tonnes)

	Forest Products				Mining and Construction			
	Coastal		International		Coastal		International	
Port	In	Out	In	Out	In	Out	In	Out
Port Hardy	13,500	32,065	-	-	-	-	-	-
Alert Bay	48,600	188,100	-	-	-	-	-	-
Port McNeill	-	259,467	-	-	563	-	-	-
Beaver Cove	66,575	1,665,665	-	-	3,592	13,774	-	-
Johnstone Strait	79,509	602,890	-	-	1,256	-	-	-
	208,184	2,748,187	-	-	5,411	13,774	-	-
Menzies Bay	-	35,337	-	-	-	-	-	-
East Coast	965,100	1,009,263	-	-	24,009	1,124,548	-	-
Campbell River	905,277	111,333	1,780	459,598	481,291	20,535	-	22,87
Courtenay	-	-	-	5,264	86,796	-	11,521	-
	1,870,377	1,155,933	1,780	464,862	592,096	1,145,083	11,521	22,87
Nanaimo	1,274,094	87,756	-	1,481,613	98,267	199,741	-	57,269
Ladysmith	44,834	246,145	-	-	1,782	-	-	-
Chemainus	65,702	521,101	-	22,487	-	-	-	-
Crofton	2,164,109	218,016	-	739,473	13,456	-	-	-
Cowichan Bay	62,953	183,129	-	111,132	-	-	-	16
Bamberton	-	-	-	-	29,531	81,686	-	21,733
	3,611,692	1,256,147	-	2,354,705	143,036	281,427	-	79,01
Sooke	28,200	40,720	-	-	-	-	-	-
Becher Bay	31,800	6,048	-	-	-	-	-	-
Esquimalt	171,628	50,400	-	-	-	-	-	-
Victoria	402,487	8,059	15,245	486,789	75,645	1,348,485	52,505	232,077
	634,115	105,227	15,245	486,789	75,645	1,348,485	52,505	232,077
Ucluelet	-	129,781	-	-	-	-	-	-
Port Alberni	651,643	93,732	599	796,874	7,304	-	55	805
West Coast-South	56,759	593,485	-	-	161	7,714	-	-
	708,402	816,998	599	796,874	7,465	7,714	55	805
Quatsino	-	4,899	-	-	9	-	-	-
Port Alice	308,525	110,972	-	24,107	12,769	309	6,548	239,554
West Coast-North	183,137	902,310	-	-	148	-	-	-
Zeballos	-	73,786	-	-	-	-	-	-
Tahsis	27,216	17,382	-	208,682	14,515	-	-	-
Gold River	297,721	89,474	-	206,520	5,177	-	-	-
	816,599	1,198,823	-	439,309	32,618	309	6,548	239,554
Grand Total	7,849,369	7,281,315	17,624	4,542,539	856,271	2,796,742	70,629	574,324

(Continued)

APPENDIX H-4 (Continued)

MARINE SHIPMENTS BY COMMODITY TYPE
AND TYPE OF SHIPMENT (1980)
(metric tonnes)

	Petroleum				Consumer Related			
	Coastal		International		Coastal		International	
Port	In	Out	In	Out	In	Out	In	Out
Port Hardy	25,254	1,469	-	-	-	-	-	-
Alert Bay	7,365	-	-	-	-	-	-	-
Port McNeill	18,349	-	-	-	-	-	-	-
Beaver Cove	-	-	-	-	-	-	-	-
Johnstone Strait	23,118		-	-	-	-	-	-
	74,086	1,469	-	-	-	-	-	-
Menzies Bay	-	-	-	-	-	-	-	-
East Coast	55,556	-	-	-	-	-	-	-
Campbell River	119,016	222	21,945	4,218	-	-	-	-
Courtenay	32,384	-	-	-	-	-	-	-
	206,956	222	21,945	4,218	-	-	-	-
Nanaimo	487,527	308	7,518	-	-	-	-	4,563
Ladysmith	-	-	-	-	-	-	-	-
Chemainus	-	-	-	-	-	-	-	-
Crofton	92,189	-	6,182	-	-	-	-	-
Cowichan Bay	9,851	-	-	-	-	-	-	-
Bamberton	5,299	-	10,617	-	-	-	-	-
	594,866	308	24,317	-	-	-	-	4,563
Sooke	770	-	-	-	-	-	-	-
Becher Bay	-	-	-	-	-	-	-	-
Esquimalt	3,683	-	-	-	-	-	-	-
Victoria	534,546	578	7,556	1,125	1,221	-	5,34	107
	538,999	578	7,556	1,125	1,221	-	5,341	107
Ucluelet	14,348	111	-	-	130	-	-	445
Port Alberni	40,394	-	29,347	-	-	-	67	1,981
West Coast-South	33,841	-	-	-	-	-	-	-
	88,583	111	29,347	-	130	-	67	2,426
Quatsino	15	-	-	-	-	-	-	-
Port Alice	39,189	-	26,824	-	-	-	-	-
West Coast-North	13,166	-	-	-	-	-	-	-
Zeballos	229	-	-	-	-	-	-	-
Tahsis	474	-	-	-	-	-	-	-
Gold River	388	-	20,472	-	-	-	-	-
	53,461	-	47,296	-	-	-	-	-
Grand Total	1,556,951	2,688	130,461	5,343	1,351	-	5,408	7,096

(Continued)

APPENDIX H-4 (Continued)

MARINE SHIPMENTS BY COMMODITY TYPE AND TYPE OF SHIPMENT (1980)

(metric tonnes)

Port	Manufacturing and Other			
	Coastal		International	
	In	Out	In	Out
Port Hardy	18	-	-	-
Alert Bay	-	1,800	-	-
Port McNeill	913	-	-	-
Beaver Cove	1,193	372	-	-
Johnstone Strait	1,909	204	-	-
	4,033	2,376	-	-
Menzies Bay	124	-	-	-
East Coast	5,280	9,293	-	-
Campbell River	3,958	478	36	-
Courtenay	-	-	-	-
	9,362	9,771	36	-
Nanaimo	20,167	759	10,680	4,530
Ladysmith	64	23	-	-
Chemainus	-	-	-	-
Crofton	1,497	1,906	27,869	869
Cowichan Bay	-	-	-	-
Bamberton	-	-	-	-
	21,728	2,688	38,549	5,399
Sooke	-	-	-	-
Becher Bay	-	-	-	-
Esquimalt	1,361	-	-	-
Victoria	735	455	1,965	9,544
	2,096	455	1,965	9,544
Ucluelet	-	-	-	-
Port Alberni	399	1,822	7,088	6,258
West Coast-South	1,887	199	-	-
	2,286	2,021	7,088	6,258
Quatsino	3,631	3,177	-	-
Port Alice	57,578	454	929	-
West Coast-North	-	-	-	-
Zeballos	-	-	-	-
Tahsis	-	-	-	-
Gold River	30,507	-	4,393	-
	91,716	3,631	5,322	-
Grand Total	131,221	20,942	52,960	21,201

Source: Statistics Canada: Cargo Tonnes Handled at Canadian Ports in International Shipping, Table B-13, 1980. Commodities Loaded at Canadian Ports in Coastwise Shipping, Table E-13, 1980.

APPENDIX H-5

INTERNATIONAL AND COASTAL MARINE SHIPMENTS (1980)

(Metric Ton)

Port	Coastal			International		
	In	Out	Total	In	Out	Total
Port Hardy	38,772	33,534	72,306	-	-	-
Alert Bay	55,965	189,900	245,865	-	-	-
Port McNeill	19,825	259,467	279,292	-	-	-
Beaver Cove	71,360	1,679,811	1,751,171	-	-	-
Johnstone Straight	105,792	603,094	708,886	-	-	-
	291,714	2,765,806	3,057,520	-	-	-
Menzies Bay	124	35,337	35,461	-	-	-
East Coast	1,049,945	2,143,104	3,193,049	-	-	-
Campbell River	1,509,542	132,568	1,642,110	25,999	486,686	512,684
Courtenay	119,180	-	119,180	11,521	5,264	16,785
	2,678,791	2,311,009	4,989,800	37,520	491,950	529,469
Nanaimo	1,880,055	288,564	2,168,619	18,197	1,547,975	1,566,172
Ladysmith	46,680	246,168	292,848	-	-	-
Chemainus	65,702	521,101	586,803	-	22,487	22,487
Crofton	2,271,251	219,922	2,491,173	34,051	740,341	774,392
Cowichan Bay	72,804	183,129	255,933	-	111,148	111,148
Bamberton	34,830	81,686	116,516	10,617	21,733	32,350
	4,371,322	1,540,570	5,911,892	62,865	2,443,684	2,506,549
Sooke	28,970	40,720	69,690	-	-	-
Becher Bay	31,800	6,048	37,848	-	-	-
Esquimalt	176.672	50,400	227,072	-	-	-
Victoria	1,014,634	1,357,577	2,372,211	82,612	729,645	812,257
	1,252,076	1,454,745	2,706,821	82,612	729,645	812,257
Ucluelet	14,478	129,892	144,370	-	445	445
Port Alberni	699,740	95,554	795,294	37,157	805,919	843,077
West Coast-South	92,648	601,398	694,046	-	-	-
	806,866	826,844	1,633,710	37,157	806,364	843,522
Quatsino	3,655	8,076	11,731	-	-	-
Port Alice	418,061	111,735	529,796	34,301	263,661	297,962
West Coast - North	196,451	902,310	1,098,761	-	-	-
Zeballos	229	73,786	74,015	-	-	-
Tahsis	42,205	17,382	59,587	-	208,682	208,682
Gold River	333,793	89,474	423,267	24,865	206,520	231,385
	994,394	1,202,763	2,197,157	59,166	678,863	738,029
Grand Total	10,395,163	10,101,737	20,496,900	279,320	5,150,506	5,429,826

Source: Statistics Canada: Cargo Tonnes Handled at Canadian Ports in International Shipping, Table B-13, 1980. Commodities Loaded at Canadian Ports in Coastwise Shipping, Table E-13, 1980

APPENDIX H-6

MARINE SHIPMENTS OF FOREST PRODUCTS 1980

(Metric Tonnes)

	LOGS		PULPWOOD		FINISHED PRODUCTS (Pulp, Newsprint, Lumber)	
	Loaded	Unloaded	Loaded	Unloaded	Loaded	Unloaded
Port Hardy	32,065	13,500	-	-	-	-
Alert Bay	188,100	48,600	-	-	-	-
Port McNeill	259,467	-	-	-	-	-
Beaver Cove	1,665,665	66,575	-	-	-	-
Johnstone Strait	601,375	79,500	-	-	1,515	9
	2,746,672	208,175	-	-	1,515	9
Menzies Bay	35,337	-	-	-	-	-
East Coast Island	620,301	692,683	309,412	260,684	79,550	11,773
Campbell River	60,216	181,302	-	722,408	510,715	3,347
Courtenay	-	-	-	-	5,264	-
	715,854	873,985	309,412	983,092	595,529	15,080
Nanaimo	37,777	91,842	22,611	926,184	1,508,981	256,068
Ladysmith	242,462	44,834	3,683	-	-	-
Chemainus	434,740	64,795	-	-	108,848	907
Crofton	135,600	798,921	30,601	1,107,090	791,288	258,098
Cowichan Bay	147,300	59,400	-	-	146,961	3,553
Bamberton	-	-	-	-	-	-
	965,497	1,059,792	56,895	2,033,274	2,588,460	518,626
Sooke	31,800	28,200	-	-	8,920	-
Becher Bay	6,048	31,800	-	-	-	-
Esquimalt	50,400	171,628	-	-	-	-
Victoria	-	364,715	273,504	2,304	221,344	50,712
	88,248	596,343	273,504	2,304	230,264	50,712
Ucluelet	129,781	-	-	-	-	-
Port Alberni	100,944	650,690	838	-	788,824	1,552
West Coast-South	559,298	56,759	34,187	-	-	-
	790,023	707,449	35,025	-	788,824	1,552
Quatsino	4,899	-	-	-	-	-
Port Alice	14,156	120,008	6,161	188,517	114,762	-
West Coast-North	902,310	183,137	-	-	-	-
Zeballos	73,786	-	-	-	-	-
Tahsis	17,382	27,216	-	-	208,682	-
Gold River	71,420	82,642	6,619	215,079	217,955	-
	1,083,953	413,003	12,780	403,596	541,399	-
Grand Total	6,390,247	3,858,747	687,616	3,422,266	4,745,991	585,979

Source: Statistics Canada: Cargo Tonnes Handled at Canadian Ports in International Shipping, Table B-13, 1980. Commodities Loaded at Canadian Ports in Coastwise Shipping, Table E-13, 1980.

APPENDIX H-7

ESTIMATES OF MILL PRODUCTION, 1978-1982

	LUMBER ('000,000 FBM)					PULP & NEWSPRINT ('000 MT)					CHIPS & HOG FUEL ('000 UNITS)				
	1978	1979	1980	1981	1982	1978	1979	1980	1981	1982	1978	1979	1980	1981	1982
CROWN ZELLERBACH															
Elk Falls Pulp Mill & Sawmill	N/A[1]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MACMILLAN BLOEDEL															
Harmac Pulp Mill - Nanaimo						343	275	334	274	253					
Harmac Saw Mills (2) - Nanaimo	285	260	255	173	98						N/A	N/A	N/A	N/A	N/A
Alberni Plywood - Port Alberni											N/A	79	85	64	37
Alberni Pulp & Paper						512	483	523	378	303					
Alberni Pacific Sawmill				88	141									N/A	N/A
Alberni Pac. - Somass Div.	N/A	N/A	200	150	N/A						N/A	N/A	N/A	N/A	N/A
Chemainus Sawmill - Chemainus	176	132	176	147	N/A						N/A	N/A	N/A	N/A	N/A
RAVEN LUMBER SAWMILL - CAMPBELL RIVER	38	47	52	46	41						N/A	N/A	N/A	N/A	N/A
GREGORY MANUFACTURING															
Field Sawmill Division - Courtenay	30	28	30	27	31						39	47	35	36	41
PACIFIC FOREST PRODUCTS															
Nanaimo Sawmill	45	49	50	48	6								29	29	5
Mayo Forest Products - Nanaimo				60	96									108	118
Ladysmith Sawmill	100	100	60	60	60						126	135	117	126	129
Victoria Plywood											N/A	N/A	N/A	N/A	N/A
CIPA - NANAIMO	61	61	68	53	63						72	72	77	64	74
DOMAN FOREST PRODUCTS															
Nanaimo Sawmill Div. - Duke Pt.				80	100									84	105
Chemainus Sawmill	N/A	N/A	N/A	N/A	40						N/A	N/A	N/A	N/A	N/A
Ladysmith Sawmill	110	98	110	105	96						153	137	153	143	153
Cowichan Bay Sawmill	138	138	138	90	109						204	204	204	134	162
BCFP															
Crofton Pulp Mill						552	527	537	478	512					
Victoria Sawmill	N/A	N/A	N/A	N/A	N/A						N/A	N/A	N/A	N/A	N/A
Victoria Plywood											N/A	N/A	N/A	N/A	N/A
Youbou Sawmill(1)	128	128	128	113	133						130	130	130	123	133
Youbou Veneer Plant											120	120	120	120	120
SOOKE FOREST PRODUCTS	5	118	44	53	17						159	132	128	90	14
ADMIRAL FOREST PRODUCTS	PROJECTED (1983): 50										PROJECTED (1983): 70				
WFP															
Honeymoon Bay Sawmill	NO LONGER EXISTS														
Rayonier Mill (Port Alice)						140	140	140	126	80					
TAHSIS COMPANY															
Sawmill - Tahsis	213	194	192	159	130						N/A	N/A	N/A	N/A	N/A
Pulp Mill - Gold River						N/A	N/A	N/A	N/A	N/A					

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[1] Not available.

APPENDIX I

ADDITIONAL RECOMMENDATIONS FOR INDIVIDUAL TRANSPORT MODES

The work done in compiling and analyzing this inventory of Vancouver Island's present transportation system revealed specific gaps in the existing information base. These gaps represent areas in which data are either missing or incomplete and where additional information would be useful in order to better understand current levels of transportation activity.

A number of areas have been identified, for example, where further analyses might help to refine the existing data or improve their accuracy. Additional analytical effort in a few key areas could produce a wider range of information, making the existing data base more useful for addressing specific policy issues or considering policy options.

Accordingly, additional recommendations are put forward below for continued data collection, additional data development, and further analytical work related to the Vancouver Island transportation system.

1.0 Automobile

1.1 The origin-destination matrices which were compiled during the current project should be further refined to provide a better fit of network loadings with traffic count data. While the procedure followed in assembling these matrices was of sufficient accuracy for the purposes of the current study, extra analytical effort could improve the utility of these trip matrices.

1.2 Following procedures analagous to those used in this study, person-trip matrices and matrices by purpose of trip could also be developed. These would be helpful in analyzing trip length for travellers and in assessing the potential for using alternate transportation modes. They might also suggest other parameters related to trip production, attraction, and distribution, thereby permitting refinement of traffic projections.

1.3 Through further analyses, the automobile trip matrices developed in this study could be of assistance in determining the extent of "by-passable" traffic at various congestion points and identifying priority road segments for planned improvement measures.

1.4 Further work to develop highway capacity measures appropriate for Island highways and to investigate highway accident rates on critical road segments is also indicated.

2.0 Ferry

2.1 During the latter stages of this study, the summer 1982 B.C. Ferry passenger survey data started to become available. While these data have been used to a limited extent in the current work, further origin-destination analyses would prove useful. At the moment, too little is known about ferry users, both drivers and foot-passengers.

2.2 Additional investigation is indicated into the impact on local streets of the high discharge rates of the "super ferries". These vessels unload upwards of 300 vehicles and 1,400 passengers in a very short time period, and thus have the potential of seriously affecting traffic levels near ferry terminals.

2.3 More information is required about the capacities of existing ferry terminals and related infrastructures. As traffic volumes increase, their impact on these facilities will have to be assessed.

3.0 Commercial Vehicles

Buses

3.1 For the purposes of the current study, only the January 1981 survey by Statistics Canada of PCL bus passengers was available. A similar survey was also conducted in August 1981, and its results should soon be available. Analyses of these data may shed more light on the origin-destination patterns of bus passengers.

3.2 Over and above data from the Statistics Canada surveys, additional market studies of bus passengers should be undertaken to determine trip purpose, reason for choice of transport mode, and ultimate origin and destination.

3.3 Information on transit bus operations should also be compiled, particularly for routes where passengers might be using them instead of inter-urban services. Network data on school bus and charter bus operations could also be collected in order to complete the information base on bus passenger traffic.

3.4 Virtually no information concerning freight traffic carried by inter-urban bus services was available for the current study. To complete the picture on bus transportation, data should be collected in this area.

Trucks

3.5 Concerning commercial trucks, it was possible during the present study to compile only a partial origin-destination matrix for truck trips. Additional surveying of trucking firms should be undertaken in order to complete this picture. It is also recommended that future road-side traffic surveys include the gathering of origin-destination information for trucks as well as passenger cars.

3.6 Problems and concerns expressed by some trucking firms about the use of ferry services across to the B.C. Mainland should be further investigated. The extent to which these problems are genuine and whether they are shared by the majority of trucking firms should be assessed and also considered from the perspective of ferry service operators.

3.7 While it is known that there is an extensive network of logging roads on the Island, no information has yet been compiled about these roads, traffic levels on them, or what impact they might have on the public highway system.

4.0 Rail

4.1 Additional market survey information is needed. Origin-destination surveys of rail passengers should be undertaken to determine purpose of trip, reason for choice of rail transportation, and ultimate origin and destination. Data on passenger sensitivity to operating schedules, price, and increased service levels would be most helpful.

4.2 Similarly, more information is needed about rail freight traffic. It is unclear whether the recent decline in rail traffic volumes has been solely the result of the economic downturn, or whether it also reflects a permanent shift to alternate transport modes. Surveys of rail users would clarify this question.

5.0 Air

5.1 In the current study, passenger and cargo information was available for only a limited number of airport locations and for only fixed scheduled (Class 1 and Class 2) services. Additional information is, therefore, required to provide estimates of traffic levels at many of the smaller air facilities and to encompass charter services and unscheduled operations.

5.2 No origin-destination data were available for air passenger travel throughout Vancouver Island. Passenger surveys should be undertaken to provide an understanding of trip purpose, reasons for choice of air travel, and ultimate origin and destination.

5.3 Data concerning the location of air navigational equipment should be collected and the available information on air facilities and services improved in order to assess the requirements of future increased traffic levels.

6.0 Marine

6.1 The sheer volume of forest product marine shipments dwarfs all other commodity shipments by this mode. Thus, the impact of marine freight services on the lifestyle and livelihood of the many smaller communities around the coastline of Vancouver Island is not readily apparent from aggregate data. Unfortunately, detailed data on these smaller freight shipments are not available. Further data collection and analysis in this area are indicated.

6.2 While some port facility information was collected as part of this project, additional data in this area would be helpful. In particular, it would be useful to know the specific docking facilities used for shipments in order to separate traffic over private wharves from shipments over public facilities.

7.0 General

7.1 Further development of the geographical zone system used in this study might be appropriate for a few areas of Vancouver Island. For example, North Saanich and the Gulf Islands are currently defined as one zone. It might be useful to have the Gulf Islands defined as a separate zone.

7.2 Improved demographic and socio-economic data for each zone would be helpful. This should include revised population estimates and possibly alternate population forecasts. Other data such as employment levels by industrial sector, types of economic activity, vehicle ownership, and income levels would be useful in the refinement of traffic projection procedures.

7.3 The sensitivity of traffic forecasts to various economic scenarios should also be determined. Alternate assumptions about employment, population and population distribution will affect travel demand projections by mode and by network link.

7.4 Procedures for modifying and updating the data generated in this study should be worked out, together with methodologies for addressing policy issues using these data and for integrating these data with other urban transportation studies.

7.5 Quantification of the likely impact on traffic levels and transportation requirements of major new developments should also be undertaken. These should include mining, port, and pipeline projects, the development of V/STOL air facilities, and the effects of alternative energy policies.

7.6 Very little is known about the multi-modal nature of commodity shipments. In particular, the extent to which rail or marine shipments are being loaded to or from commercial trucks is an important question.

7.7 Similarly, market studies and analyses of the ultimate origins and destinations of passengers is essential for services which are potentially in competition with each other. For example, it is unclear whether VIA Rail and Pacific Coast Lines serve the same or different markets along the Victoria-Courtenay corridor. Similarly, PCL and B.C. Transit services may have overlapping markets, as might the main routes of the B.C. Ferry Corporation and the various air carriers flying between Victoria and Vancouver.